

**Dissociation, Perceptual  
Processing, and Conceptual Processing in Survivors of  
the Christchurch Earthquakes 2011**

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## **ABSTRACT**

Fatal earthquakes such as that which occurred in Christchurch on February 22<sup>nd</sup> 2011, can result in survivors having difficulties with cognitively processing the event, which may be the precursor to posttraumatic stress symptoms. Trauma related dissociation has been proposed to be a mechanism related to these cognitive processing difficulties. Most research focusing on information processing and dissociation post-trauma has conducted controlled analogue studies or has not focused solely on information processing and dissociation. There is also scant research on these constructs across therapy. In response to this gap in research, two studies were developed. An association was proposed between dissociation and information processing as demonstrated by an increase in conceptual processing and a reduction in dissociation. It was predicted that an improvement in these constructs would be related to a reduction in PTSD symptoms over therapy. Study1 applied a case-study design to 5 individuals who were attending therapy for post-traumatic stress disorder in response to the trauma they had experienced from the Christchurch earthquakes. Study 2 assessed information processing and dissociation (via self and observer report) in 20 individuals who had direct exposure to the effects of the earthquake. Earthquake information processing and dissociation were assessed as they were happening nearly two year's post-quake using correlation analyses and hierarchical regressions. The hypotheses were partially confirmed, in that an increase in conceptual processing was not shown to be associated with a reduction in dissociation. However, an increase in conceptual processing was shown to be related to trauma symptom improvement particularly for re-experiencing symptoms. In addition, study 2 demonstrated a possible relationship between trait dissociation and arousal symptoms. These findings partially support the proposed role information processing and dissociation play in the recovery from PTSD. The findings suggest that trauma related difficulties should be assessed as early as possible to resolve issues related to a delay in symptom reporting.

# Chapter 1

## Introduction

The mental imprints left after a personally traumatic experience have been the subject of much investigation by trauma theorists and researchers. The process by which victims of trauma either avoid their traumatic memories or confront and make sense of them allows researchers to examine the effects of trauma in those affected by anxiety disorders such as posttraumatic stress disorder (PTSD). Memories of traumatic events are often initially incomplete, or like an unfinished jigsaw contain disjointed pieces not integrated into a coherent representation of the event. Dissociation may be a process involved in the production of trauma memories as it is considered a way of organising information in an unintegrated manner (Van der Kolk, Van der Hart, & Marmar, 1996), or at least initially limiting memory to only the affective and sensory strands of an experience (Van der Kolk & Fisler, 1995).

While dissociation may have an initial adaptive function (Horowitz 1986; Van IJzendoorn & Schuengel, 1996), this benefit may be short-lived. Dissociation has been speculated to be involved in the inability to retrieve and process deeply distressing events (Ehlers & Clark, 2000). Over the course of two studies, this thesis explored the premise that in order for all the fabric of memory to be tightly woven or integrated, adequate processing of the event memories must occur and the influence of dissociation must be reduced (Ehlers, Hackmann, & Michael, 2004).

An overview of PTSD, its symptomatology and prevalence is initially provided. Subsequently, attention is given to one of the critical components of PTSD - deficits in adaptive information processing, which relies on perceptual and conceptual processing. In this section the effect of trauma-event information processing on the development of PTSD

symptoms such as intrusions and an inability to form an intact account of a traumatic experience will be discussed. The current notion of dissociation in PTSD and how this complex phenomenon prevents the normal process of recovery after trauma will then be reviewed, noting that despite having some adaptive utility at the time of trauma, dissociation also limits an individual's ability to comprehend and cope with trauma (Hartman Burgess, 1993; Giesbrecht, Lynn, Lilienfeld, & Merckelbach, 2008).

To understand the interconnection between dissociation and information processing, the next section reviews research literature supporting the association between high dissociation and high perceptual processing after trauma. Some consideration is given to other factors implicated in obstructing adequate comprehension of trauma, such as the experience of negative emotion during the trauma. Emotion is considered because it is said to be related to greater perceptual processing after trauma (Arntz, Groot, & Kindt, 2005).

The February 2011 6.3 magnitude earthquake in Christchurch in which 185 people died ([www.police.govt.nz/list-deceased](http://www.police.govt.nz/list-deceased)) and large parts of city were significantly damaged or destroyed, and its aftermath involving hundreds of aftershocks, provided an opportunity to investigate the relationship between information processing and dissociation after a traumatic event in 1) those who were treatment-seeking for PTSD and 2) those who were not treatment-seeking but may have experienced some post-traumatic reactions related to the earthquake. The interconnection between information processing and dissociation in relation to post-traumatic symptoms was explored in both groups. Using quantitative methods drawn from narrative gathering, this thesis argues that fundamentally there is a strong association between dissociation and information processing in the development and maintenance of PTSD symptoms.

## **1.1    *Overview of Post-traumatic Stress Disorder***

### **1.1.1    *Symptomatology***

PTSD has been conceptualised as a reaction to extreme distress and subsequent avoidance of a traumatic event. Dysfunctional coping after a traumatic event can manifest in the core PTSD symptoms of unwanted re-experiencing of the event, hyperarousal, emotional numbing and avoidance of stimuli which may remind the individual of the trauma (Briere & Spinazzola, 2005; American Psychiatric Association [DSM-IV-TR], 2000). While not everyone will experience all these symptoms following a traumatic event, a proportion of individuals will experience some symptoms over a significant period of time (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Individuals who continue to demonstrate the core symptoms associated with their traumatic experience for more than one month are said to have PTSD. The intensity of symptoms will differ between individuals based on symptom structure, type and duration of traumatic experience, personality characteristics, and social and other factors (Echeburúa, 2010). In addition, these individuals may have social and occupational difficulties which prevent them from continuing to lead healthy and happy lives. One of the core deficits demonstrated in individuals with PTSD is that of information processing and information processing has been strongly linked to some of the cognitive symptomatology seen in PTSD (Huntjens, Dorahy, & Van Wess, in press).

### **1.1.2    *Prevalence Rates***

PTSD varies in lifetime prevalence rates from 7.8% to 12.3% in the general population (Echeburúa, 2010). Approximately 50% of those who do meet criteria for PTSD recover within two years (Echeburúa, 2010). In comparison almost 33% do not experience complete remission of symptoms, even after several years (Echeburúa, 2010). In addition, PTSD is probably the most common psychiatric condition to manifest in the aftermath of a



disaster (Norris et al., 2002; Neria, Gross, & Marshall, 2006). Prevalence rates of PTSD after disaster range from 2% to 67% (Norris, Kaniasty, Conrad, Inman, & Murphy, 2002). PTSD has been one of the most commonly studied reactions to disasters but there have been few studies looking at the long term effects of natural disasters. Some studies suggest that post-disaster rates of PTSD decline over time (Carr et al., 1997a; Carr et al., 1997b; Van Griensven et al., 2006) while others suggest an increase (Norris, Perilla, Riad, Kaniasty, & Lavizzo, 1999; Wang et al., 2000).

## **1.2    *Information processing after a Traumatic Event***

### **1.2.1    *Information processing approach to Memory***

The information processing approach to memory is considered one of the most widely theorised explanations for understanding how information is stored and retrieved (Roediger, Gallo, & Geraci 2002). The idea that the processing of information could be divided into two distinct classes was developed by Roediger, Weldon and Challis (1989). Roediger and colleagues divided information processing into two categories, namely perceptual processing and conceptual processing. Thus, the memory of a task or event can be biased towards retrieving perceptual “structural” features of an event or to conceptual aspects where the focus is on the meaning of the event (McGann, Ellis, & Milne 2003). Both these processes are shown to be important in prospective remembering (remembering to perform an action or intention when appropriate) (McGann et al., 2003).

### **1.2.2    *Perceptual Processing***

Data-driven or perceptual processing refers to bottom-up processing of sensory impressions and perceptual characteristics, such as stimuli form and structure (Lyttle, Dorahy, Hanna, & Huntjens, 2010). Strong perceptually-driven memories usually concern

the physical features of an event (i.e., remember seeing a friend, talking to someone; driving home). Perceptual processing is usually associated with aspects of implicit memory - that is, the type of memories that may be involuntary triggered by perceptual cues (e.g., colours, shapes) - that can influence an individual's behaviour without awareness of the memory (Arntz et al., 2005). Perceptual processing has been separated from conceptual processing as these processes have been shown to be task specific. Most tests of implicit memory have been perceptually based (e.g., word completion, perceptual identification; Weldon, Roediger, Beitel, & Johnson 1995). Performance on a predominately perceptual test is affected by the surface similarity between the study and test stimuli, as the physical features determine the type of retrieval processes that occur (Weldon et al., 1995). Perceptual information is considered part of the situationally accessible memory system, for example in the case of trauma-related flashbacks (perceptual) they are only triggered involuntarily by situational reminders of the trauma (Brewin, 2001). The situationally accessible memory system is often considered to be poorly verbally communicated and lacks conceptual qualities (Arntz et al., 2005). The conceptual qualities of memory are necessary for a complete narrative of the experience.

### 1.2.3 *Conceptual Processing*

Conceptual processing refers to top-down processing where information about the situation/stimulus is integrated into the context in which it occurred and given meaning. Conceptual processing is brought about through elaboration and organization of memory (Lyttle et al., 2010). Contextual information about an experience may involve having an understanding of why the event happened and what this means for the individual. Conceptual processing is voluntarily accessible and is connected to other autobiographical memories (Arntz et al., 2005). On a task that demands greater conceptual processing performance will

be improved when the task requires meaningful processing such as elaboration or the formations of association (Weldon et al., 1995).

#### 1.2.4 *Information Processing of Traumatic Events in those without PTSD*

In the aftermath of a trauma, the retrieval of trauma information is often isolated to perceptual/sensory impressions (i.e., perceptual details) and this is often the first type of information which the individual can recall (Ehlers & Clark, 2000). By keeping trauma information in active awareness, fragments of the trauma can be pieced together and trauma can be steadily processed on a conceptual level, at which point successful trauma resolution can occur (Hartman & Burgess, 1993). In those that have made a successful recovery after trauma, active strategies designed to avoid trauma are unnecessary. As the trauma is no longer perceived as threatening or distressing, they feel no need to devote attention to extensive active coping efforts to manage it (Snyder & Pulvers, 2001). Often coping techniques are required for a short time in order for the individual to process and integrate the traumatic experience. Fortunately for most people, normal coping mechanisms are not overwhelmed and a coherent narrative involving both perceptual and conceptual representations of the trauma will evolve with little or no therapeutic intervention.

#### 1.2.5 *Information Processing of Traumatic Events in those with PTSD*

The way in which traumatic memories are processed appear to be different to other memories stored within the autobiographical memory system (Van der Kolk & Fisler, 1995). As the experience of a traumatic event is essential for a diagnosis of PTSD, it is the foundation to the development of the disorder. Yet, the mechanisms by which some people experience a trauma and recover and others do not, is still unclear. One of the primary processes considered to be important as to why some people develop PTSD and others do

not, is the process of encoding trauma related information (Ehlers & Clark, 2000). Current studies of PTSD and peritraumatic responses support the idea of there being compromised memory processing in PTSD (David, Akerib, Gaston, & Brunet, 2010).

Traumatic memories that remain confined to perceptual or sensory elements rather than a complete picture of the experience represent the cognitive basis of PTSD. Van der Kolk and Fisler (1995) claim that from their review of current literature and their experience working with traumatised populations, traumatic experiences are fragmentary. Such narratives often have few linguistic components and the content of a traumatic narrative is confined to sensory representations of the event including visual images, olfactory, auditory or kinesthetic sensations that are related to the traumatic experience (Van der Kolk & Fisler, 1995). Some individuals remain processing only perceptual details of the trauma, failing to build a narrative of their experience and this is often the case for individuals with PTSD.

When an individual processes a traumatic event solely on a perceptual level, they are at risk of re-experiencing the traumatic event as sensory intrusions. Intrusions are the hallmark of PTSD symptoms (Ehlers et al., 2002; Ehlers et al., 2004). The survivor of a traumatic event may re-experience the sight of headlights coming towards them as had happened in a car accident or a glimpse of a knife which triggers flashbacks of an assailant standing before them with a weapon, which had occurred during an assault (Kleim, Ehring, & Ehlers, 2012). Many researchers (Ehlers et al., 2004; Michael, Ehlers, Halligan, & Clark, 2005; Kleim et al., 2012) suggest triggers that precipitate the onset of intrusions in individuals with PTSD are perceptually similar to the intrusive content or to the stimuli that signaled the onset of the traumatic experience.

Intrusive memories act as a faulty warning signal that indicates to the individual impending danger. This reinforces that there is a current threat to mental and physical wellbeing (Ehlers & Clark, 2000). In addition to this, individuals experiencing symptoms

such as intrusions may have negative appraisals associated with the trauma. These include statements like, ‘people will hurt me,’ ‘I can’t cope with my feelings,’ and ‘danger is all around me.’ Thus the person feels continuously at risk of further trauma well after there is no longer an objective threat to personal safety (Brewin, Dalgleish, & Joseph, 1996; Ehlers & Clark, 2000; Foa & Rothbaum, 1998).

While perceptual processing itself is not harmful to the recovery process, it is the continual reliance on perceptual processing that prevents elaboration of the memory representation and impedes conceptual processing. Individuals, who experience PTSD, remain with a perceptual representation of the event and fail to conceptually process it. In order for information to be processed conceptually, the individual must first be able to voluntarily retrieve the important perceptual elements of the trauma. Kindt, Buck, Arntz, and Soeter (2007) studied 25 community based patients who met the primary diagnosis of PTSD and were undergoing treatment. After recording their trauma narratives pre-treatment, post-treatment and at a 1 month follow up they found that an initial increase of perceptual processing during treatment (e.g., remembering through therapeutic guidance perceptual aspects of the event) was strongly related to a subsequent increase in conceptual processing after treatment. Kindt et al. (2007) make the argument that voluntary and systematic retrieval of perceptual representations promotes conceptual processing and promotes successful recovery.

A failure to effectively transition to a conceptual representation is thought to be caused by a lack of elaboration of all the information necessary to make sense of the event. As traumatic events are highly stressful, all an individual’s coping resources are called upon, so only important aspects relevant for survival are encoded by the individual (Ehlers & Clark, 2000). According to Ehlers and Clark (2000), the worst moments of the traumatic event are often poorly elaborated and insufficiently connected to the context of any relevant

information surrounding the trauma and other non-traumatic autobiographical memories. This lack of context and elaboration of traumatic memories produces incoherent and fragmented traumatic narratives that contain largely sensory and affective information (Huntjens et al., in press). Therapeutic interventions aimed at memory elaboration through carefully reliving aspects of the trauma are necessary for a complete traumatic narrative to emerge (Foa & Rothbaum, 1998). Unfortunately for some individuals, cognitive processes in response to trauma such as dissociation complicate the recovery of trauma memory (Halligan, Michael, Clark, & Ehlers, 2003).

### **1.3     *Dissociation as a Coping Style in PTSD***

#### **1.3.1   *Defining dissociation***

The concept of dissociation was first developed by Pierre Janet in the early 20<sup>th</sup> Century. Janet defined *dissociation* as a lack of integration among two or more different “systems of ideas and functions that constitute personality” (Janet, 1907). Currently however, the term dissociation has been expanded and to some degree revised in psychology and psychiatry to refer to (a) symptoms; (b) a presumed cause of symptoms, including a presumed function such as psychological defence (Cardena, 1994); (c) normal and pathological alterations of consciousness, including hypnosis; and d) a structural organisation of the personality, which is more akin to Janet’s original understanding (Dorahy & Van der Hart, 2007; Van der Hart & Dorahy, 2009; van der hart, Nijenhuis & Steele, 2006). The American Psychiatric Association (1994) defines dissociation as “a disruption of the usually integrated functions of consciousness, identity or perception of the environment”. In contrast to this definition of dissociation, Nijenhuis and Van der Hart (2011) suggest that dissociation involves a lack of integration of personality. Nijenhuis and Van der Hart (2011)

suggest that during relieving of trauma, patients with PTSD reconstruct a former “I” and “here and now” that they mistake for the actual I and “here and now”. Although the concept of dissociation has been developed by a number of researchers the term often is undefined in empirical and clinical studies (Nijenhuis & Van der Hart 2011). The next section will outline the different ways dissociation is being studied in this thesis.

### 1.3.2 *Peritraumatic Dissociation*

Research has consistently found peritraumatic dissociation to be a risk factor in the development of posttraumatic symptoms (Breh & Seidler 2007). Peritraumatic dissociation is characterised by a cluster of symptoms consisting of emotional numbing, detachment from others, and reduced responsiveness to surroundings, depersonalisation and derealisation which occur while experiencing the traumatic event (Cardena & Spiegel, 1993; Marmar et al., 1994). Examples of peritraumatic dissociative experiences include feeling as though acting on automatic pilot and experiencing the trauma as if it were happening to someone else.

There have been numerous studies suggesting that peritraumatic dissociation is a precursor to the development of PTSD (Shalev, Peri, Canetti, & Schreiber, 1996; Spiegel Koopman, Cardena & Classen, 1996). Ozer, Best, Lipsey, and Weiss (2003) conducted a meta-analysis of 68 studies of posttraumatic stress disorder with seven predictors of posttraumatic stress disorder. These included perceived life threat during the trauma and post-trauma social support. They found that peritraumatic dissociation was the strongest predictor of PTSD in the analysis. Furthermore, other studies noted that retrospectively reported peritraumatic dissociation statistically predicts PTSD symptoms and severity (Marmar et al., 1999; Shalev et al., 1996; Otts, Marchand, & Courtois, 2012).

### 1.3.3 *State Dissociation*

State dissociation describes dissociation which the individual is currently experiencing. State dissociation occurs in the presence of a current trigger in the immediate environment, this is reduced when the trigger is no longer there (Hallings-Pott, Waller, Watson, & Scragg 2005).

### 1.3.4 *Persistent (Trait) Dissociation*

Persistent dissociation, although experienced the same as peritraumatic and state dissociation subjectively (i.e., emotional numbing, detachment from others, reduced responsiveness to their surroundings, depersonalisation and derealisation) is dissociation that lingers well after the traumatic event (Panasetis & Bryant, 2003).

### 1.3.5 *The Relationship between Dissociation and Posttraumatic Stress Disorder*

During a traumatic event where an individual experiences significant distress, dissociative reactions can often occur (Marmar, Weiss, & Metzler, 1998). Dissociation has been considered by some to be an adaptive response to an adverse situation which is beyond the individual's normal processing capacity as it renders the individual unable to process the complete experience while it is occurring (van der Kolk & Fisler, 1995; van der Kolk & van der Hart, 1989). Peritraumatic dissociation is said to protect the individual from such intense feelings as helplessness, horror and fear (Van der Hart, Van Ochten, Van Son, Steele, & Lensvelt-Mulders, 2008). Van der Kolk and Kadish (1987) claim that dissociation allows relatively normal functioning for the duration of the trauma and also helps to continue to keep the personality largely unaffected by the trauma. Although dissociation can protect the individual from negative peritraumatic emotions, it does however increase the risk of general psychopathology, especially stress related disorders such as posttraumatic stress disorder,



over time. (Bremner & Brett, 1997; Briere, Scott, & Weathers, 2005; Duncan, Dorahy, Hanna, Blampied, & Bagshaw, in press; Marmar et al., 1998; Van der Kolk et al., 1996).

The predictive power of peritraumatic dissociation for PTSD may be nuanced and more pertinent to relatively acute PTSD. For example, Freedman, Brandes, Peri, and Shalev (1999) found peritraumatic dissociation predicted PTSD at four months but not 12 months. Contemporary views on the origins of PTSD symptoms suggest that experiencing peritraumatic dissociation as a mode of coping with the trauma can prevent the full awareness of trauma being realised and takes away ownership of the experience. Dissociating from the experience also diminishes the ability to learn from the trauma and this creates a propensity to develop a clear reference to what occurred during the experience (Van der Kolk et al., 1996).

The link between persistent dissociation and PTSD has been supported in most PTSD literature. Briere et al. (2005) claim that a link between persistent dissociation and PTSD is not surprising, as dissociation is a key component of the diagnosis (in the DSM-IV) of acute stress disorder and an associated feature of PTSD. They found that persistent dissociation had a role in the maintenance of posttraumatic symptoms. They argue that persistent dissociation may constitute a signal for the emergence of posttraumatic stress disorder.

Whilst switching off to the trauma prevents an individual from experiencing fear and horror on a daily basis, the long term lack of integration of trauma can cause difficulties in terms of active problem-solving and this can support passive psychological adaptation. One of the main ways that dissociation is said to contribute to the development of PTSD symptoms is its effects on processing and integrating the trauma into an elaborate and coherent trauma narrative (Van der Kolk et al., 1996).

## 1.4 *The Relationship between Dissociation & Trauma Processing in PTSD*

Dissociation has been proposed to lead to memory fragmentation because it heightens and maintains perceptual processing and impedes conceptual processing (Dorahy, 2011; Huntjens et al., in press). Spiegel (1997) proposed that dissociative symptoms signal that there are deficits within the organisation, as well as structure of mental contents after trauma.

### 1.4.1 *Trauma Film Paradigm: Trauma Processing & Dissociation*

There has been a variety of recent research investigating the link between trauma processing and dissociation using the trauma film paradigm. The trauma film paradigm is an analogue version of a “real” traumatic event. The paradigm exposes a non-clinical participant sample to a short film depicting scenes of stressful or traumatic events (Holmes & Bourne, 2008). Holmes and Bourne (2008) contest that the trauma film paradigm provides an invaluable tool for insight into the factors and mechanisms relevant during memory encoding in order for intrusive memories to be formed. The trauma film paradigm is considered by some to be the closest model to a “real” traumatic experience and has been used to assess posttraumatic effects such as dissociation and difficulties with processing distressing experiences. The utility of the trauma film paradigm is that analogue “trauma” is able to be created in real time (Holmes, Brewin, & Hennessy, 2004). In addition, this analogue situation allows for the study of trauma in a laboratory setting where traumatic responses can be carefully monitored (Lazarus, Opton, Nomikos, & Rankin, 1965).

Using the trauma film paradigm in the second of two studies, Halligan, Clark, and Ehlers (2002) assessed the association between trauma processing and a variety of posttraumatic measures, e.g., measuring depression, intrusions and avoidance and anxiety. Participants were divided into two groups; either a conceptual (instructed to *concentrate on the story, think about what is going to happen next, what is happening in the scene and why*)

or perceptual (instructed to *become absorbed in the images and sounds*). In session 1, before viewing a traumatic video, participants completed the trait dissociation questionnaire, among other measures. Participants were then exposed to a videotape consisting of vivid traumatic content. After a 10 minute break, participants carried out the free recall task. In session 2, participants completed the posttraumatic symptoms questionnaire and the videotape memory questionnaire. Halligan et al. (2002) found that the data-driven processing and conceptual processing groups differed in trait dissociation, in that the data-driven group scored higher on the Trait Dissociation Questionnaire (TDQ). Halligan and colleagues also found a significant correlation between the degree of data-driven processing and the number of analogue PTSD symptoms reported. There were however no group difference on any of the analogue symptom measures.

Dissociation has been shown to be implicated in the development of trauma-related intrusions. In a series of experiments, Holmes et al. (2004) had nonclinical participants view a trauma film under a variety of encoding conditions. They were asked to record any spontaneous intrusive memories of the film over the following week in a diary. Dissociation while watching the film was both artificially-induced by having participants engage in dual processing task and was also assessed spontaneously, by asking participants how much they dissociated. Participants were required to perform a visuospatial pattern tapping task at the time of encoding, this task involved continuous tapping of a five-key complex pattern on a keyboard concealed from view. Performing the visuospatial task while encoding, was shown to significantly reduce the frequency of later intrusions. Yet, with the introduction of a verbal distraction task in a follow- up experiment intrusions were increased when a verbal distraction task was introduced (participants were asked to count backward in threes from 958 throughout the film without stopping) while watching the video. This task was designed to block verbally-accessible memory formation. The results indicate that spontaneous

dissociation during encoding, rather than analogue dissociation, increased intrusions (perceptual memory). This led the researchers to conclude that an increase in dissociation is associated with later intrusions related to the traumatic event.

Dissociation may cause deficits in information processing. Buck, Kindt, and van den Hout, (2006) indicated that state dissociation and perceptual processing are related. In a study of 34 participants with spider phobia, the participants' current level of dissociation was measured with the Peritraumatic Dissociative Experiences Questionnaire (PDEQ) following exposure in vivo (people moved gradually from looking at a spider to touching a spider with a stick, having a spider walk over one to several fingers, and finally handling a spider solo). Measures of perceptual experiences, memory representations and fragmentation, self-rated memory fragmentation, spider fear and spider beliefs were assessed at one-week follow-up. Participants also recorded, in a diary, answers to questions relating to intrusions over the seven days following exposure. Their study showed a relationship between state dissociation and perceptual memory representation in observer-rated measures of memory disturbances. Although the researchers found only observer-rated measures supported the relationship between perceptual processing and state dissociation, they suggest that the findings may imply that since perceptual memory representations are thought to be the result of sustained data-driven processing, dissociation has detrimental effects on information processing. No relationship was found between state dissociation and observer-rated memory fragmentation. Dissociation was positively related to frequency of intrusions.

Studies investigating subjective and objective memory fragmentation and dissociation in PTSD indicate that there is a relationship between state dissociation and objective memory fragmentation. (Buck et al., 2006; Kindt, Van den Hout, & Buck, 2005) These studies failed to find a relationship between dissociation and objective fragmentation

measures, however, this failure could be due to individuals being prompted for certain details about the trauma by the researchers.

A review of literature on the trauma film paradigm lead Holmes and Bourne (2008) to conclude that while studies indicate that spontaneous peritraumatic dissociation affects intrusion frequency, they suggest that artificial dissociation does not adequately represent naturally occurring dissociative responses. In addition, the trauma film paradigm may not necessarily elicit the same level of distress as personally experiencing a life threatening situation. The trauma film paradigm has largely not made use of clinical samples which has limitations when measuring posttraumatic symptoms.

#### 1.4.2 *Clinical Studies: Trauma Processing & Dissociation*

Another study measured the effects of dissociation on trauma processing using a clinical population. Lytle et al. (2010) assessed the role of state dissociation in threat-related perceptual priming. They assessed participants with and without chronic PTSD. Participants were required to complete a series of tasks including a modified version of the word-stem completion task and a word-cue association task to assess perceptual and conceptual priming, respectively. The word-stem completion task required participants to read a list of words (e.g., 'plane', 'stay') and later respond to word stems ('pl---', 'st--'). Participants who completed stems with previously seen words, rather than other words (e.g., 'plant', 'stop') were thought to demonstrate perceptual priming. The word-cue association task measures priming for the task and measures priming for previously encoded words using cue-words associated with previously encoded target words as semantic retrieval cues. For successful retrieval to take place conceptual processing must occur. The word-cue association task required participants to concentrate on each word displayed on the screen and were instructed to call out as quickly as possible the first word that the cue word made

them think of. The word-cue association task was developed to demonstrate conceptual priming. Lytle and colleagues also assessed the role of dissociation in threat processing. Dissociation was measured using the Dissociative Experiences Scale (DES) and the Clinician-Administered Dissociative State Scale (CADSS) for experiences while completing the task. The results suggest that enhanced perceptual priming for trauma-related words was associated with measures of state dissociation. These findings are consistent with research suggesting that dissociation interferes with focal attention during trauma, and this promotes more perceptual processing after trauma (Brewin et al., 1996; Siegel, 1995). These results combined with those above help to highlight the need to further investigate the role of dissociation in trauma processing, as dissociation has been shown to be connected to the development and maintenance of perceptual processing, and consequently PTSD symptoms.

Although dissociation has in many studies demonstrated a strong link to deficits in information processing, not all studies support the strength of this relationship. Murray, Ehlers and Mayou (2002) sampled road traffic accident survivors and assessed them on measures of dissociation, memory fragmentation, data-driven processing, rumination and PTSD. Partial correlations between data-driven processing and PTSD at both four- week and six-month follow-up remained significant even when peritraumatic dissociation was controlled for. They however, did find dissociation to be a strong predictor of subsequent PTSD following the accident. This may indicate that there are other factors which are important in mediating the relationship between dissociative symptoms and trauma processing.

#### 1.4.3 *Trauma Narratives and Dissociation*

Dissociative processes have been postulated to be involved in trauma survivors' disorganised and incoherent trauma narratives (Rubin, Feldman, & Beckham, 2004). Harvey

and Bryant (1999) studied participants who did and did not meet the diagnosis of acute stress disorder (ASD) in response to a motor vehicle accident. Participants were asked to provide an account of their experience of the motor vehicle accident following the instructions used by Foa, Molnar and Cashman (1995):

*'In a moment I will ask you to tell me all about your accident, how you felt, what you saw, everything. In other words, I am going to ask you to relive the trauma. I am going to ask you to recall your memory of the accident as vividly as possible. I would like you to describe the accident in the present tense, as if it were happening now, right here. I would like you to close your eyes and tell me what happened during the accident in as much detail as you remember. This includes details about the surroundings, your activities, how you felt and what your thoughts were during the accident'.*

Each narrative was divided into utterance units containing only one thought or action and assessment was made for both for dissociation and disorganisation. Examples of dissociation included numbing, detachment and reduced awareness. Statements such as 'I asked the doctor knows a few things we got everything came back to me' were considered to represent disorganisation. Their results suggest that the participants who were diagnosed with ASD had more disorganisation in their narratives as well as more dissociation.

In another examination of dissociation and trauma narratives in ASD, Moulds and Bryant (2005) conducted a qualitative study to establish if dissociation impedes the encoding and organisation of traumatic memories over the course of cognitive behavioural therapy for motor vehicle accident trauma. Participants were asked to give an account of their traumatic experience, both pre-treatment and post-treatment following the instructions used by Foa et al., (1995). Measures of ASD and depression symptoms were also taken. At post-treatment, participants were assessed for PTSD symptoms during the previous week. Narratives were coded according to the constructs of dissociation, disorganization and threat identified by Harvey and Bryant (1999). Dissociation included references to emotional numbing, reduced awareness of surroundings, derealisation, dissociative amnesia, time distortion and

depersonalization. Disorganization included examples of disjointedness in the narrative, confusion of details and repetition of an utterance. Treatment included prolonged exposure and cognitive restructuring. Coherence (integration) and organisation of traumatic memories were shown to be related to dissociative symptoms. A change in dissociation over treatment correlated with a change in disorganisation over treatment. That is, a reduction in dissociation was associated with more organised narratives. Narratives were also significantly longer after treatment.

Peritraumatic dissociation has been shown to affect reading ease and grade level of trauma narratives. Zoellner, Alvarez-Conrad and Foa (2002) investigated reading ease and grade level after sexual and non-sexual assault. The researchers collected trauma narratives from participants seeking treatment for chronic PTSD. Participants reported either high or low peritraumatic dissociation, which was measured using the PDEQ. The narratives of their assault were coded in terms of physical structure, grade level and ease of reading as well as emotional content. Those individuals with high peritraumatic dissociation demonstrated lower reading ease (only significant when peak distress during recounting was included). However, those people who experienced greater dissociation during the retelling of their narrative also had higher grade level narratives, included more negative feelings in the pre-threat section of their narrative and displayed a trend towards more sensations across all sections of the narrative than the low dissociative group.

In sum, the literature indicates that dissociation influences the processing of trauma information. Findings allude to the possibility that dissociation may heighten the likelihood of perceptual processing, and isolating memory to perceptual representations may cause the fragmentation and incoherency observed in trauma narratives (see Huntjens et al., in press). As these narratives begin to encapsulate conceptual components, memory is shown to become more coherent and organised, and dissociation is lessened.



## **1.5.    *Alternative Mechanism for disrupted information Processing***

### **1.5.1    *Trauma Disclosure***

Simply talking about the traumatic event has been proposed to influence the change in narratives across time/treatment. Van Minnen, Wessel, Dijkstra, and Roelofs (2002) compared narratives of improved and non-improved patients with PTSD during imaginal exposure therapy. For 60 minutes, participants were required to think about their traumatic experience as vividly and in as much detail as they could. Treatment consisted of nine week prolonged imaginal exposure sessions. Narrative changes from the first to the last exposure session were compared. The results show that during treatment all patients showed a significant increase in references to internal events and a decrease in references to external events. All patients showed improvement in measures of disorganised thoughts, however, the decrease in disorganised thoughts was greater in those who showed improved in their PTSD symptoms post-therapy. The authors therefore, concluded that it was the exposure treatment that was responsible for the change in narrative characteristics rather than only changes in memory representation.

### **1.5.2    *Negative Emotion***

The experience of a traumatic event is often accompanied by strong negative emotions. These emotions have been proposed to affect the way in which victims of trauma process and comprehend what has happened to them. Arntz et al. (2005) examined the effect of emotion on cognitive processing, distinguishing between perceptual and conceptual processing using the framework proposed by Roediger (1990). Participants were required to view slides which were accompanied by a story with either an emotional content or neural content. In week two the memory of the story and slides were assessed. Emotion promoted a

better recall of traumatic information in terms of perceptual representations when compared to neutral information. As perceptual processing was shown to be superior to conceptual processing in the emotion condition, the authors reasoned that emotion promotes perceptual memory by enhancing the encoding of perceptual aspects over conceptual and results in the common PTSD symptoms of intrusions and reliving. Ongoing dissociation may impeded conceptual processing and maintain perceptual representations of the emotional event (Huntjens et al., in press)

### 1.5.3 *Attention*

Some focus in the area of information processing has been given to the role of attention in inhibiting conceptual processing and maintaining perceptual processing. Recently, in a study by Connell and Lynott (2012), attention was proposed to interfere with conceptual processing when a perceptual stimulus is presented concurrently or preceding a conceptual task. Drawing from previous studies using a variety of attentional paradigms, attention for perceptual aspects is said to interfere with the uptake of conceptual information because perceptual stimulus occupies attention and leaves few resources free for conceptual processing (Connell & Lynott 2012). In contrast, other studies have indicated that attention facilitates conceptual processing as the perceptual stimulus directs attention to a particular perceptual modality without occupying resources (Connell & Lynott 2012). The role attentional processes play in mediating the consolidation of conceptual information is unclear but could have value in explaining how conceptual knowledge is created. This study does, however, confirm that in order for conceptual knowledge to be consolidated, perceptual processing must occur thus, conceptual processing relies on the initial presence of perceptual information (Connell & Lynott 2012).

In summary, greater trauma disclosure during therapy may support the development of a more coherent narrative, and negative emotion about the trauma and a narrowing of

attention has been shown to inhibit conceptual processing and increase perceptual processing. However, the factors discussed above are beyond the scope of this thesis' research. These factors are indeed important for further investigation and consideration as they may give strength to the relationship between trauma processing and the development of PTSD symptoms. For the purposes of this research the focus will be on the influence of information processing (perceptual and conceptual processing) and dissociation in the development of PTSD following trauma.

## **1.6    *Aims***

The main aim of this thesis is to understand if dissociation and information processing are related processes. More specifically, this study seeks to assess when dissociation may be linked to perceptual processing and whether greater conceptual processing of trauma memories occurs when the level of dissociation is reduced over time. The notion that dissociation and cognitive processing of trauma are interconnected processes has been supported by a number of studies (Foa & Riggs, 1993; van der Kolk & Fisler, 1995; Ehlers and Clark, 2000). These studies place dissociation as a forerunner to providing a foundation for a variety of cognitive deficits seen after trauma. This notion of dissociation interfering with the ability of an individual to create a conceptual framework of the traumatic experience will be investigated over two studies, the first in those seeking treatment for earthquake-related PTSD and the second in those who had direct exposure to the Christchurch earthquakes, by being in the most affected areas at the time of the earthquake (city centre), being trapped or being involved in rescue operations. The first study will look at the link between dissociation, processing and PTSD symptoms over the course of treatment using a case study approach. In order to extend study One a second study was developed to also examine if there is an association between dissociation and processing

styles after a traumatic event, however, study one investigated the change in these two processes across therapy. There has been little research which has solely focused on these by-products of trauma in PTSD for those individuals seeking cognitive-based therapy.

Both studies used widely utilized measures of peritraumatic, state, and trait dissociation and measures of information processing style to assess if there was a change in dissociation and information processing across time. The current studies draws on the research by Buck et al. (2006), however, this study will solely focus on dissociation and information processing after trauma. This study also aims to add to the literature examining how both dissociation and information processing are associated with experiencing more post-traumatic symptoms after trauma.

The outline of these two studies is as follows:

1. The first study aimed to assess the change in information processing, dissociation and post-traumatic symptoms pre, mid and post-therapy (12 weeks) in those diagnosed with PTSD related to the Christchurch earthquakes.
2. The second study aimed to assess the association between information processing (assessed between 4-7 months post-trauma) and a variety of dissociation measures (state dissociation 4-7 months post-trauma, retrospective peritraumatic dissociation at 18-20 months post-trauma) with current dissociation and post-traumatic symptoms in those individuals with direct exposure to the Christchurch earthquake.

## **Chapter 2 Change in PTSD Symptomology over the course of Therapy**

### **2.1 Introduction**

Study 1 was developed out of the theory that trauma victims with PTSD often have difficulties consolidating the experience of trauma into a complete memory representation. This study utilised people with chronic earthquake-related PTSD. Studies suggest that after earthquakes, PTSD symptoms can be enduring. A longitudinal study following a significant earthquake in Newcastle (Australia) demonstrated in those individuals with post-traumatic symptoms at six months post-earthquake, 48% still meet the diagnostic criteria for PTSD at the two-year assessment (Carr et al., 1997 $\alpha$ ). Another study, of two villages in China, post-earthquake demonstrated PTSD rates 19% within three months and 24% within nine months after the disaster (Wang et al., 2000). This shows that PTSD symptoms can often be delayed after disaster-related trauma. These studies, as with other research (Bland, O’Leary, Farinaroe & Trevisan, 1996; Kato, Asukai, Miyake, Minakawa & Nishiyama, 1996), shows PTSD can still be measured in some individuals months and years after the quake.

Cognitive therapies are often utilised as a way for individuals who are experiencing PTSD symptoms to find meaning out of the disaster. Cognitive therapies such as Cognitive Behavioural Therapy (CBT) have been shown to improve post-traumatic symptoms. Shooshtary, Panaghi, and Moghadam (2008) found that post-traumatic symptoms were reduced in terms of intrusions, avoidance and arousal following CBT as well as overall PTSD scores after the 2004 earthquake in Iran. Başoğlu, Şalcıoğlu, and Livanou (2007) administered two groups of earthquake-related PTSD sufferers either a single session of behavioural treatment or repeated sessions (4, 8, 12 & 24 weeks). Patients in the repeated treatment group continued to show improvements in their post-traumatic symptoms up to six months post-trauma (improvements in their symptoms stabilized past this period). Overall, the findings also indicated that considerable

improvement in fear of future earthquakes at follow-up was related to improvement in PTSD symptoms.

The process by which cognitive-based therapy helps to reduce and hopefully eliminate an individual's dysfunctional beliefs about the trauma is still not completely understood. What we do know is that CBT is highly effective for treating PTSD (Kindt et al., 2007). Kindt et al. (2007) argued that with CBT for PTSD individuals create a new perspective on what happened during the trauma. As with the current study, Kindt et al. were interested in how trauma processing may influence new perspectives of the event. This is argued to be possible because the memory representation of the event gets more conceptually processed during therapy. Their study involved assessing a change in trauma processing across therapy at pre, post and at one-month follow up for PTSD. The way in which CBT is thought to exert its effects on trauma processing is through focusing on perceptual details of the traumatic event in therapy which helps to appraise the experience or the person's own emotional reactions so a more elaborated (conceptual) representation can be forged (Kindt et al., 2007). During treatment, the function of a perceptual-focus at least initially is to create a realistic basis from which conceptual processing can occur (Kindt et al., 2007). The findings from this study indicate that the increase in conceptual processing predicted treatment outcome in PTSD symptoms at one-month follow-up. Kindt and colleagues suggest that even with the increase in perceptual processing during therapy the presence of greater conceptual processing was thought to be the predictive factor in positive treatment outcome. The current study draws from the conclusions of this study supporting a link between a change in information processing (greater conceptual processing) predicting therapy outcome for PTSD, but extends this research to include dissociation as a mediating factor in this relationship. Previous studies (Harvey & Bryant 1999) suggest dissociation

influences the organisation of narrative dialogue as assessed across treatment after post-trauma stress.

Undergoing cognitive therapy has been shown to be effective in terms of both treating dissociative symptoms and cognitive restructuring around traumatic experiences. There has been some research which suggests that, as individuals show improvement in dissociation, they become better able to engage with the trauma experience. The impact of cognitive processing therapy on a number of post-traumatic reactions in PTSD was investigated by Resick, Suvak, Johnides, Mitchell, and Iverson (2012). Resick et al. (2012) argue that therapy that focuses on finding meaning to the trauma (i.e., processing the trauma conceptually) was found to be most effective in those who were most dissociative.

## **2.2    *Study 1***

By asking participants to rate how they experienced the traumatic event as well as obtaining their narratives of this event across therapy, in addition to assessing their level of dissociation in response to trauma, allowed for a change in trauma processing and dissociation to be identified. Using a case study design, and following current research, it was predicted that participants who exhibit an increase in conceptual processing across therapy would experience a sequential reduction in dissociation. This would indicate that these are related processes where dissociation was inhibiting adequate processing of trauma information, thus restricting conceptual processing of the event.

## **2.3    *Method***

### **2.3.1   *Participants***

Participants were recruited from a treatment programme in Christchurch for PTSD. Five participants, two men and three women were assessed at the start and then at one of two

different time points during therapy. Nine people undergoing therapy were eligible for the research but four of these declined to be involved in all research projects. All participants were 18 years or over. All met the diagnostic criteria for PTSD and were treatment-seeking for post-traumatic symptoms. Those with a learning disability, a diagnosed psychotic disorder, severe substance abuse and traumatic brain injury were excluded from the study. Those with a low English literacy level were also excluded, given the narrative and questionnaire design. All participants volunteered for the study and had been experiencing difficulty coping with trauma associated with the Christchurch earthquakes.

Table 1

*Demographic Information of Participants in Case study*

<i>Pseudonym</i>	<i>Gender</i>	<i>Age</i>	<i>Ethnicity</i>	<i>Baseline Diagnosis</i>	<i>Occupation</i>
P1	Female	52	Caucasian	PTSD	Business -currently unemployed
P2	Male	58	Caucasian	PTSD, Major depression, generalised anxiety disorder	Retail Manager
P3	Female	23	Caucasian	PTSD, major depression	Administrator
P4	Male	40	Caucasian	PTSD, Major depression, OCD	Retail/Business
P5	Female	37	Caucasian	PTSD, Major depression, generalised anxiety disorder , panic disorder	Teacher

P= Participant

### 2.3.2 Measures

*The Post-traumatic Diagnostic Scale (PDS; Foa Cashman, Jaycox & Perry, 1995)*

The PDS is a 49-item measure designed to diagnose PTSD based on DSM-IV criteria. This measure identifies potentially traumatising events and asks the respondents to rate how they



reacted to the event when it occurred. This determines whether this experience could be considered a stressor according to DSM IV stressor criteria (Criterion A1 ‘the person experienced, witnessed or was confronted with an event that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others’ and Criterion A2, ‘the person’s response involves intense fear, helplessness, or horror). The PDS also measures the three symptom clusters of PTSD, namely re-experiencing, avoidance, and arousal. On a four-point scale, respondents rate 17 items representing the core symptoms of PTSD experienced in the past 30 days. The final series of questions assess the level of impairment across nine domains of functioning (e.g., work, relationships). Respondents achieve a symptom severity score which ranges from 0-51. The cut-offs for symptom severity rating are 0 no rating, 1-10 mild, 11-20 moderate, 21-35 moderate to severe and >36 severe. The PDS has been shown to have high internal consistency and test-reliability. Furthermore, the PDS has a high agreement with other trauma-related measures including the Structured Clinical Interview for the DSM-III-R (SCID; Spitzer, Williams, Gibbons, & First, 1990). The SCID is a diagnostic exam to determine DSM-IV Axis I disorders (major mental disorders) and Axis II disorders (personality disorders). The PDS also has good sensitivity and specificity which makes it a useful screening and assessment tool for detecting PTSD (Foa et al., 1997). Each item is rated on a severity scale of 0 (being lowest) to 3 (being highest) so that the total score ranges from 0 to 51 (Foa et al., 1995).

*The State Dissociation Questionnaire (SDQ; Murray et al., 2002,  $\alpha = .88$ ).* The SDQ is a self-report nine-item scale of state dissociation. This measures the extent to which an individual is currently experiencing dissociation. A variety of dissociative features are assessed such as derealisation, depersonalisation, detachment, altered time sense, emotional numbing, and reduction of awareness of surroundings. Participants are asked to answer on a

Likert –type 5-point scale ranging from "1 = this applies to me NOT AT ALL" to "5 = this applies to me EXTREMELY." The SDQ has good reliability and validity with traumatized populations such as those with PTSD (Halligan et al., 2002, 2003; Murray et al., 2002). The SDQ correlates strongly with the Peritraumatic Dissociative Experience Questionnaire (PDS) which measures how much an individual dissociates during a traumatic experience (Marmar, Weiss, & Metzler, 1997). The SDQ is a discrete measure within the larger Cognitive Processing Questionnaire developed by the same researchers. The SDQ was used in this study to assess the level of state dissociation present during the retelling of the participant's earthquake experience.

*Peritraumatic Dissociative Experiences Questionnaire (PDEQ; Marmar et al., 1997; Marmar et al., 1994).* Peritraumatic dissociation was assessed using the 10-item Peritraumatic Dissociative Experiences Questionnaire—Self-Report Version which measures acute dissociation during a specific traumatic event. Respondents are asked to indicate on a 5-point scale (1=not at all true, 5=extremely true) to what extent they experienced particular dissociative symptoms (e.g., "I felt confused or couldn't make sense of what was happening") during or shortly after a traumatic event. The PDEQ is considered to be a reliable and valid measure to determine self-reported peritraumatic dissociative symptoms (Marmar et al., 1997; Marmar et al., 1994).

*Dissociative Experience Scale (DES; Carlson & Putnam, 1993).* The DES is a self-report scale asking respondents to indicate on an 11-point scale ranging from 0-100 in 10-point increments the extent to which they experience 28 dissociative phenomena in daily life. These include mundane experiences like daydreaming, through to more severe dissociative symptoms like identity alterations (van IJzendoorn & Schuengel, 1996). The DES has good reliability and validity as a measure of trait dissociation (Lytle et al., 2010). The DES-taxon

refers to 8-items from the DES (items; 3, 5, 7, 8, 12, 13, 22, 27) which are sensitive to detecting more pathological dissociation (Waller, Putnam, & Carlson 1996).

### 2.3.3 *Procedure*

Before treatment commenced, the researcher made contact with all individuals enrolled in the 12 week individual therapy program (N=11) at The Department of Psychological Medicine, Christchurch. Interested participants (n=5) signed a consent form (see Appendix A) detailing the confidential nature of the study and their ability to withdraw at any time without consequences to their treatment. Three participants were interviewed at the pre- and mid-treatment (5 weeks) phases (one of these was interviewed post-treatment as well). Two further participants were interviewed at pre- and post-treatment (12 weeks) phases. This difference in the second assessment was to determine if the link between dissociation and perceptual/conceptual processing was evident at the start, middle and end of therapy, or just one or two of these.

Participants were administered via clinical interview the full PDS at the pre-treatment assessment. In the second assessment participants were given only part 3 and 4 of the PDS as these relate to the detection of current post-traumatic symptoms. Following completion of the PDS, participants were asked to discuss the experience that has led them to having the symptoms which brought them to treatment. Participants were asked to give as much detail about the traumatic event as they could and think about the experience as if it were happening now (i.e., present tense). Following this instruction, participants were asked to discuss how they understood the experience (i.e., have they gained any new understanding and perspective about the event). No time limit was set for each narrative. The purpose of asking about the participant's understanding of the event was to exclusively detect the presence of conceptual memories of the trauma. The researcher did not interrupt

or prompt participants while they were discussing their trauma memory, however, if the experimenter noticed the participant was becoming agitated or demonstrating signs of extreme stress then they were supported to determine whether they would like to continue or stop. Participants were informed before the assessment began that their narratives would be recorded for research purposes.

Immediately following the narrative retelling, participants were administered the State Dissociation Questionnaire (SDQ) to assess how much they felt they were dissociating during the retelling of their experience. Once they had completed this, they were administered in randomized order the PDEQ to assess how much they felt they had experienced dissociative symptoms during the traumatic experience and the DES to assess how much they felt they experience dissociative symptoms in their daily life. The participants were instructed to discuss the same traumatic event for each assessment. This was done in order to compare each participant's memory processing style at each interval and with their scores on dissociation at that same interval. Once participants had completed the study they were given a \$20 voucher for their time. The participants' psychologist (from the Department of Psychological Medicine) was present for all of the interviews except the interviews conducted for participant 1 as they felt the information gained from listening to their narrative might be useful during therapy with their client.

#### 2.3.3.1 *Coding of Narratives*

The narratives were recorded and then transcribed verbatim. Following the same methodology as Foa et al. (1995) and Harvey and Bryant (1999) the beginning of the narrative was signaled by the first expression of danger and the end of danger was defined as the point with which the threat was no longer present in the narrative. Each thought, action or idea (utterance units) within the narrative was rated on the degree to which it

reflected conceptual and perceptual memory representations. Each utterance unit was rated according to the scoring manual developed by Buck, Kindt, van den Hout, Steens, and Linders (2007). Perceptual/conceptual memory representations were measured by rating each utterance on a nine-point scale from one (exclusively conceptual memory representations and/or contextualizations) to nine (exclusively perceptual memory representations). A higher score refers to more perceptual memory representations. Each part of the utterance that represented a physical feature (perceptual memory representations) was marked and each part of the utterance that represented a conceptualization was marked differently. All references to time of day, date or location were scored as contextual information. For example, the utterance “I remember that I woke up with an oxygen mask on my face” was scored as a perceptual memory representation (score = 9). An example which consisted of two utterances was: a) The first day, they kept me asleep, b) because I was in too much pain. “The first day” was scored as a contextualization. “They kept me asleep” was scored as a perceptual memory representation. Thus utterance “a” received a score of 6. “b” was scored as a conceptual memory representation (score 1). Two raters were given all narratives with which to code. To control for differences in narrative length a mean score was calculated for all utterances.

#### 2.3.4 *Ethical Approval*

This study was approved by the Central Regional Ethics Committee (see Appendix B1) and the University of Canterbury Human Ethics Committee (Appendix B2).

#### 2.3.5 *Visual Analysis*

Data from the five case-studies were analysed using the graphic software SigmaPlot (version 11). A number of scatter plots were created. The purpose of this was to assess if there was a change in post-traumatic symptoms (PTSD), dissociation and information

processing (mean) scores across therapy. These modified Brinley plots (Blampied, 2007; Rucklidge & Blampied, 2011) plot each individual participant's scores on a single measure at time one (X-axis) against time two (Y-axis). If there is no change over time the individual data point will lie on the diagonal line of no change. If there is change over time the extent of change will be indicated by the distance of the data point above or below the diagonal line. As described in Rucklidge and Blampied (2011), it is possible to partition the graph space to indicate a descriptive status of each individual, using some established classification scheme. This is used in Figure 3 below to classify each individual before therapy and then later as to the degree to which they were displaying generally perceptual or generally conceptual processing of trauma memories.

## **2.4 Results**

As seen in Figure 1, in terms of PTSD symptoms (assessed via the PDS) only participant 1 (P1) and participant 3 (P3) showed improvement in PTSD symptoms across therapy (scores below the diagonal line reflect improvement from baseline assessment). P3 showed significant improvement on all three PSS symptom subscales (i.e., re-experiencing, avoidance, and arousal), while P1 showed meaningful improvement in all PTSD measures except avoidance (see Fig 1).

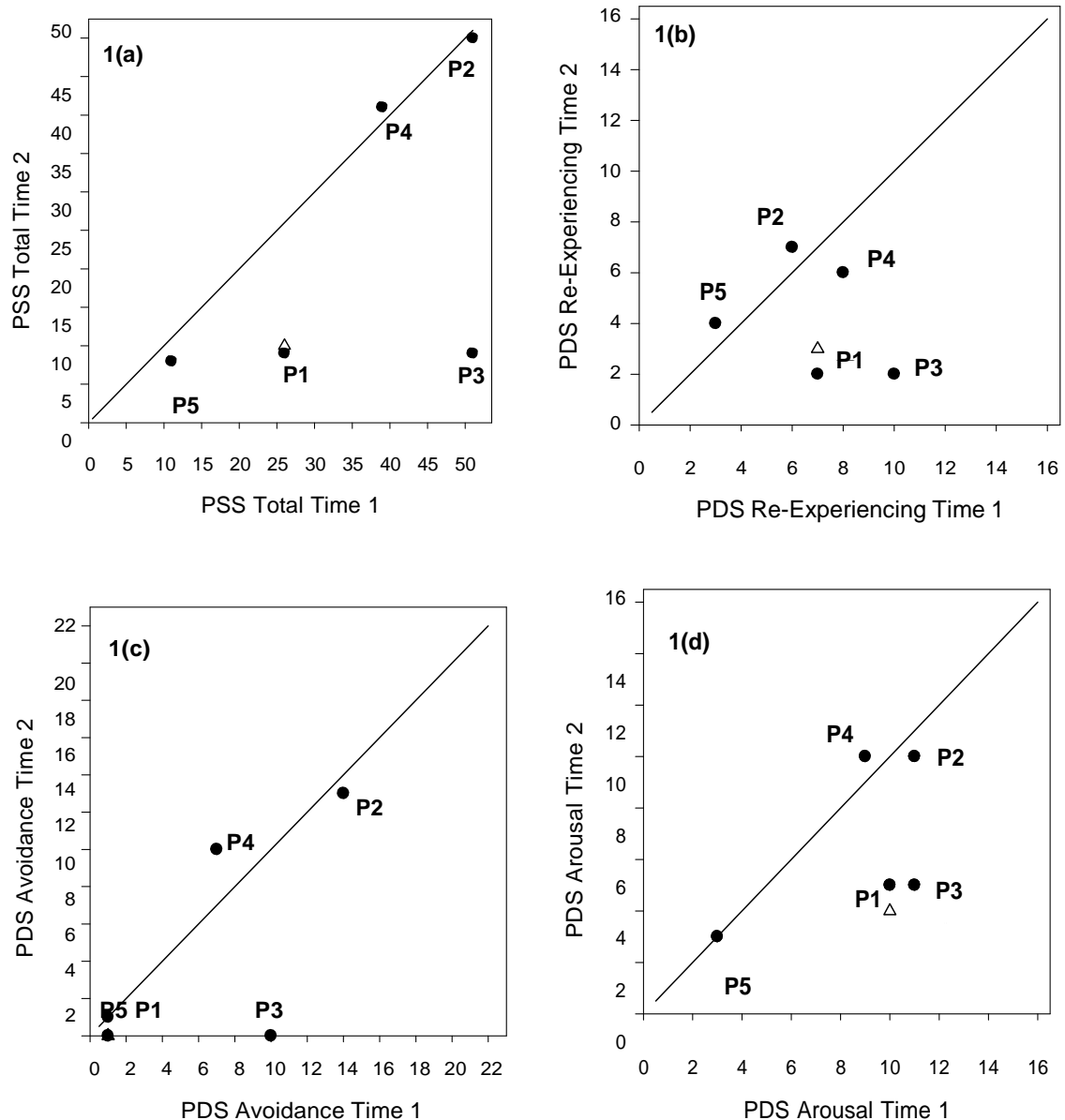


Fig. 1 Change in Post-traumatic Symptoms; Re-experiencing (1b), Avoidance (1c) and Arousal (1d) across Therapy. Total scores representing how much each participant changed in their symptom level from pre-therapy to mid-therapy (week 5) for participants 1, 4 & 5 and post-therapy for participants 1, 2, 3 (week 12) for PTSD symptoms. ▲ represents the week 12 score for participant 1. The solid diagonal line represents the line of no change between time 1 and time 2 measures. PSS scores represent the total Post-traumatic symptom score on the PDS. PSS scores are the total re-experiencing, avoidance and arousal symptom scores combined. Participant 5 reported the first Christchurch earthquake in September as the most traumatic earthquake NOT February so this experience was used for this participant. The triangle symbol for P1 shows the score for the follow-up assessment; the points for the other participants were at various points during therapy (see Procedure, above).

For the dissociation measures, participant 5 (P5) showed significant improvement on all the dissociation measures, namely state dissociation (SDQ); peritraumatic dissociation (PDEQ) and trait dissociation (DES) over the course of therapy. Participant 2 (P2) showed significant improvement only in terms of peritraumatic dissociation (see Fig 2).

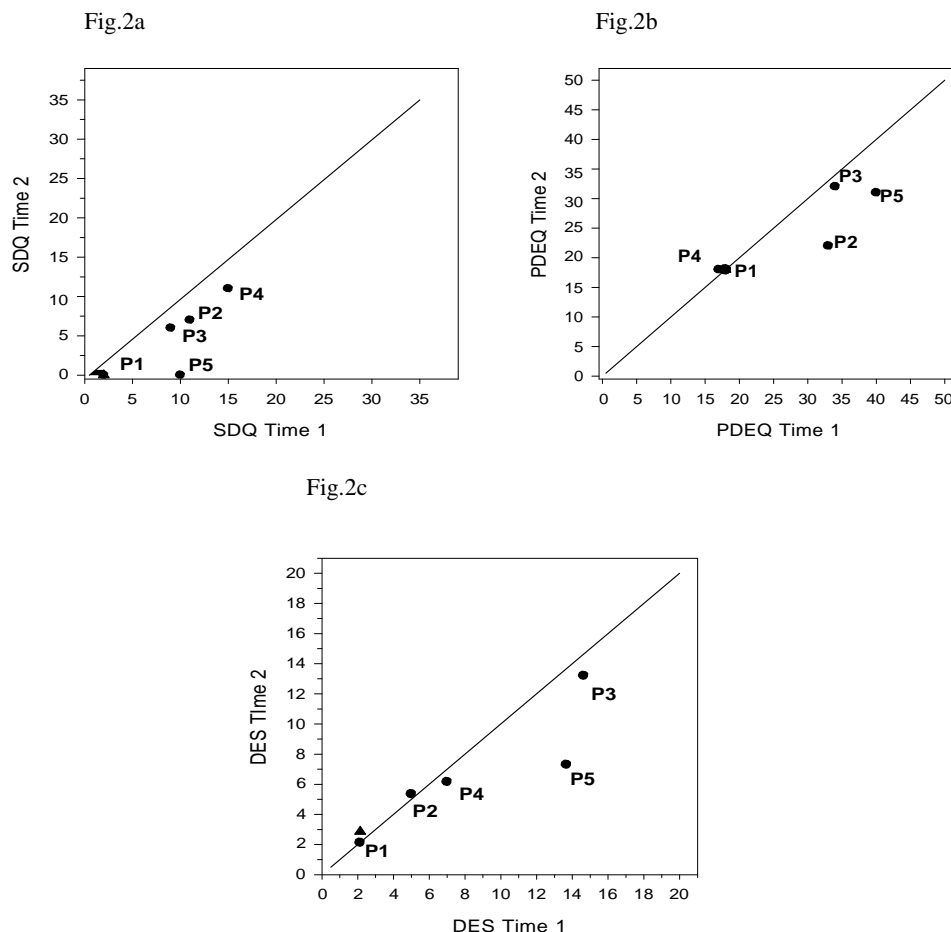


Fig. 2. Change in State (2a), Peritraumatic (2b) and Trait (2c) dissociation across Therapy. Total scores representing how much each participant changed in their level of dissociation from pre-therapy to mid-therapy (week 5) for participants 1, 4 & 5 and post-therapy for participants 1, 2, 3 (week 12) for dissociation. SDQ =State Dissociation Questionnaire; PDEQ= Peritraumatic Dissociative Experiences Questionnaire; DES=Dissociative Experiences Scale.

Lastly, changes over time in information processing of trauma memories from perceptual to conceptual processing, is shown in Figure 3. The measure is split at the midpoint to show the shift in processing style. The conceptual/perceptual proportion of this plot represents high conceptual processing when assessed pre-therapy and an increase in



perceptual processing mid/post-therapy. The perceptual/perceptual proportion of this plot represents high perceptual processing when assessed pre-therapy and an increase in perceptual processing mid/post-therapy. The conceptual/conceptual proportion of this plot represents high conceptual processing when assessed pre-therapy and an increase in conceptual processing mid/post-therapy. The perceptual/conceptual proportion of this plot represents high perceptual processing when assessed pre-therapy and an increase in conceptual processing mid/post-therapy. Results plotted thus, the data (Figure 3) showed that only P1 made meaningful improvement from pre-therapy to post-therapy in terms of information processing. Note, however, that this improvement was only small and only evident at week 12. P2 had a slight change towards more conceptual processing from pre-therapy to post-therapy (week 12) (see Fig 3).

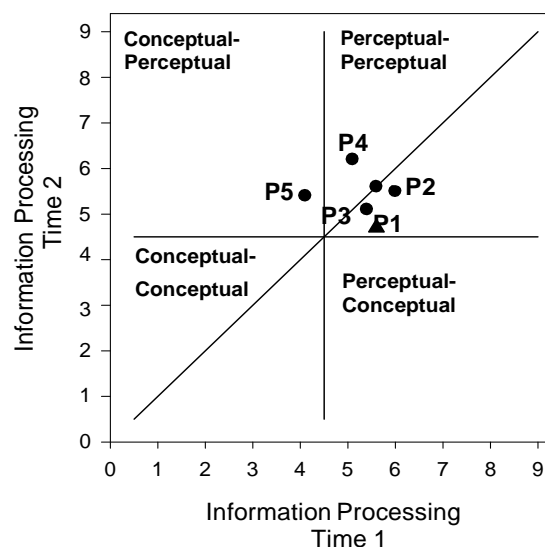


Fig. 3 Change in Processing and Conceptual Processing across Therapy. Mean scores representing how much each participants' information processing scores changed from pre-therapy to mid-therapy (week 5) for participants 1, 4 & 5 and post-therapy for participants 1, 2, 3 (week 12).

Summary: In pulling the findings together, I conclude that there was no solid overall indication that individuals who increased in conceptual processing experienced a reduction in dissociation as hypothesised. However, none of our participants become significantly worse in terms of PTSD symptoms and dissociation following therapy. There was a trend

towards improvement for all participants on at least some of the measures across therapy. For one participant (P1), PTSD symptoms reduced when measured at week 12 and their narrative also become more conceptual at the same interval. Interestingly, participant 5 (P5) showed a slight shift towards greater re-experiencing symptoms during therapy and also a more perceptual narrative at the same interval (5 week of therapy) compared to their pre-therapy narrative.

## **2.5 Discussion**

This study (study 1) was developed to assess the relationship between information processing and dissociation over cognitive-based therapy for PTSD, with assessments taken pre-treatment, and then mid-treatment and/or post-treatment. This study used a case-study design which provides a snap-shot of the experiences of individuals who had been diagnosed with PTSD and may have experienced dissociation and deficits in information processing in response to disaster trauma. Most research on dissociation and information processing has conducted studies using larger sample sizes to assess PTSD and related deficits on a variety of post-trauma measures (Buck et al., 2006; Lyttle et al., 2010). However, this study was unique in its goals of trying to determine when symptom improvement was evident (i.e., mid or post therapy) and what variables may be associated with this change. The methodology was designed to assess whether a systematic relationship was evident between self-reported dissociation (measured as state, peritraumatic, and trait experiences), information processing (assessed via narrative coding approximately two years after the Christchurch earthquakes) and posttraumatic stress disorder symptoms. The findings did not produce any solid evidence for a systematic relationship between these variables across therapy.

One of the participants (P1) showed a reduction in PTSD symptoms and also an increase in conceptual processing from pre-therapy to post-therapy (12 weeks). This

demonstrates that at least for this individual there might be a link between processing of trauma information in a more conceptual manner and reduced PTSD symptoms. All participants were treatment-seeking for PTSD, with four individuals being diagnosed with at least one other comorbid psychiatric diagnosis.

## 2.5 Detailed Case Studies

### 2.5.1 Case Study 1:

The first participant showed no association between information processing and dissociation. However, as the participant showed improvement in PTSD symptoms, particularly arousal and re-experiencing, their narrative became more conceptual from pre-therapy to post-therapy. Although it cannot be concluded from this finding that there is an association between these variables it does show that at least for some people there may be a connection between the information processing style and the development of PTSD symptoms. Participant 1 was the only participant who had a single diagnosis of PTSD while the other participants had at least two other diagnoses., This may have made the findings from this case-study a more pure test of the theory as the findings are not affected by other anxiety disorders or depression. In addition, participant 1 was able to be assessed at pre-therapy, mid-therapy and post-therapy, thus allowing the researchers to gather more information about this participant at a variety of assessment points.

### 2.5.2 Case Study 2:

For case-study 2, only peritraumatic dissociation was shown to improve from pre-therapy to post-therapy however, peritraumatic dissociation was assessed retrospectively at least two years post-trauma. This change in retrospective reporting may be affected by

factors such as how an individual felt on the day of assessment or forgetting how much dissociation they experienced at the time of the earthquake (Candel, & Mercklebach 2004).

### 2.5.3 Case Study 3:

Case study 3 made significant improvement on all the PDS symptom measures of re-experiencing, avoidance and arousal. However, this participant did have high levels of PDS pre-therapy, so may have had greater recovery potential when PTSD symptoms were measured post-therapy (regression to the mean). There was little change to their level of dissociation across therapy and there was only minimal change towards greater conceptual processing as assessed from pre-therapy to post-therapy.

### 2.5.4 Case Study 4 & Case Study 5:

Case study 4 Case Study 5 assessed participants at pre-therapy and mid-therapy (week 5). Both participants did not show any significant improvement in terms of PTSD symptoms. Participant 4 did not show any significant improvement on dissociation and had an increase in perceptual processing across therapy as indicated by their earthquake narrative. This does support the theory that dissociation and perceptual processing could be related processes as being high on perceptual processing is associated with greater dissociation (Lyttle et al., 2010). Participant 5 showed an improvement in dissociation across therapy on state peritraumatic and trait dissociation however their earthquake narrative was high on conceptual information pre-therapy and became more perceptual when measured mid-therapy. Most studies have measured a change in conceptual processing post-therapy or at follow-up (Kindt et al., 2007). At post-therapy or follow-up, there may have been a change back towards greater conceptual processing as the participant was able to remember more details about the earthquake which may be important for the development of conceptual processing (Kindt et al., 2007). It was reported anecdotally by a psychologist P5

engaged in avoidance strategies during the retelling of their earthquake narrative. Using avoidance strategies may have prevented them from fully engaging with the details within their narrative, which may have also been a possible strategy used by participant 4. Both Participants 4 and 5 had extremely short narratives which could be due to the time delay between the retelling of their earthquake experience and the earthquake event itself.

#### 2.5.5 Strengths & Limitations

There was only one individual within the case series who had a single diagnosis of PTSD. As described in Table 1 most participants had either a co-morbid diagnosis of depression or another anxiety disorder and this may have affected the findings as anxiety and depression are thought to affect the recovery from PTSD symptoms. As the research only looked at five case studies it is unable to provide conclusive evidence to support an association between the variables in this study and larger samples of participants. However, this study does add to the literature on information processing and dissociation showing that this relationship is complex and may not be as strong in some individuals as in others. This study does support the positive impact that therapy has for people with PTSD as all our participants showed a trend towards improvement. Reliable observer ratings of dissociation were used and we were able to obtain a good range of ages and genders given our small sample size. When comparing assessments of dissociation and information processing from mid therapy to those taken post-therapy, only at the 12 week point (post-therapy) was there meaningful change across time. Therefore future studies which seek to assess the relationship between dissociation and information processing may be best to assess these constructs post-therapy or follow-up.

Findings did not show a systematic link or any systematic changes between dissociation, information processing and PTSD symptoms across therapy. This small series

of case studies requires verification and support from a larger sample of earthquake-affected individuals who may have experienced significant emotional distress. This case study was important because it showed that with a case-study of trauma-affected individuals the association between an increase in conceptual processing and a reduction in dissociation after earthquake-related trauma is not fully illustrated in such a small sample group. The association between these variables was further assessed in earthquake-exposed adults in Christchurch in Study Two.

## **Chapter 3 Changes in Symptomology in Earthquake-affected Individuals**

### **3.1 *Introduction***

To further understand the relationship between information processing and dissociative symptoms and to extend the findings in Study 1, a second study was conducted. This study investigated the constructs of dissociation and information processing after earthquake exposure with a sample from a population who had been exposed to the earthquake but not diagnosed with PTSD. As participants were not therapy-seeking they could reasonably be thought to represent the reactions of most individuals who are exposed to traumatic events. Reactions in non-treatment seekers following trauma range from full PTSD to few if any symptoms (Carlier & Gersons, 1997; Bonanno, Brewin, Kaniasty, & La Greca, 2010). In this second study, participants had significant exposure to the February, 2011 Christchurch earthquake in that they were in the city centre and exposed to the destruction, experienced being trapped in collapsed buildings or had been rescue workers trying to extract those trapped or killed.

The link between memory and dissociation in non-therapy seeking individuals has been reported in a number of studies. In a sample of undergraduate students who were exposed to an analogue traumatic experience, dissociation was shown to be linked to memory deficits (Olsen & Beck, 2012). This further supports the idea that dissociation affects cognitive processes involved with the conceptualisation for that event in those who may not meet the diagnostic criteria for PTSD or seek treatment in the aftermath of trauma.

Most studies have investigated the constructs of dissociation and cognitive processing immediately post-trauma. Clinical studies often assess individuals immediately after discharge from the hospital or rehabilitation clinic (Buck et al., 2007). Analogue trauma studies also assess these trauma constructs immediately following trauma-exposure (Buck et al., 2006; Halligan et al., 2002). These studies have been able to demonstrate that

trauma processing and dissociation contribute to the development of post-traumatic or post-traumatic-like symptoms. As measures of dissociation and trauma-processing taken immediately post-trauma link these constructs with PTSD symptoms, the current study planned to assess the strength of these findings further by assessing participants for these constructs months after the traumatic event to investigate whether this relationship was still significant and at what point dissociation and information processing can still predict PTSD symptoms.

### 3.2 *Study 2*

This study was designed to examine if dissociation was linked to perceptual/conceptual processing as well as PTSD symptoms in a non-treatment seeking sample from a population with high earthquake-exposure. As part of a separate community project, participants provided a narrative of their experience in the city centre in the moments and hours following the quake. These narratives were given four to seven months after the quake and were designed to add to the archive of earthquake-related experience that were housed and on display in the Christchurch Museum and The University of Canterbury CEISMIC Digital Archive. These videotaped narratives were secured by the researchers with the participant's consent and assessed for perceptual/conceptual processing as well as behaviourally-coded instances of state dissociation while telling their story on camera. These participants were later assessed for PTSD, trait dissociation and retrospective peritraumatic dissociation of experiences during the quake (between 18-20 months after the earthquake and at least 12 months after providing their narrative). The uniqueness of this particular study was that participants shared their earthquake experience after they had some time to process the event. Moreover, the prospective study design could determine if processing of the event and state dissociation at assessed at this point 4-7 months after trauma was related to the development of PTSD symptoms. Thus the study examined whether ongoing



perceptual processing of the earthquake experience at around four to seven months post-quake, along with state dissociation, could predict PTSD symptoms at least 18 months post-quake. In addition, the study looked at whether state, trait and retrospective peritraumatic dissociation were related to perceptual processing and PTSD symptoms.

It was hypothesized, first, that perceptual processing of the event, as assessed four to seven months after the quake via a narrative reproduction of autobiographical events occurring when the earthquake struck would predict later increases in PTSD symptoms. Second, state dissociation was expected to be associated with less conceptual processing in the earthquake narratives. Further, increased levels of trait dissociation have the effect of maintaining perceptual processing (and hamper conceptual processing) after trauma resulting in a correlation between increased levels of trait dissociation and greater perceptual processing after trauma. Finally, retrospectively assessed peritraumatic dissociation was expected to lead to increases in perceptual processing which would lead to PTSD symptoms.

### **3.3 Method**

#### **3.3.1 Participants**

Participants were adults highly exposed to the February earthquake in Christchurch. They had volunteered to tell their story to an independent group wanting to chronicle earthquake experiences, and in the current study they volunteered to be assessed about their experience during and since the quake. The sample (N=20) was made up of 9 males and 11 females. Participants were aged 18 years and above. The participants had a mean age of 46.50 years (SD = 13.08). The sample was made up of those in the city centre (where the most deaths, injuries, and major building collapses occurred) during the 22<sup>nd</sup> February 2011 earthquake and who were trapped (n=5), involved in rescuing people (n=5) or supporting the

rescue effort i.e. providing food or support for rescue workers (n=7), witnessed the destruction of building etc or had no role (n=3). Of the sample fifteen individuals were in a relationship at the time of the earthquake. The types of occupations of the sample at the time of the earthquake included Manager/ director or consultant (n=5), retail or customer service (n=5), teacher (n=3), contractor/emergency service (n=4), doctor (n=1), artist (n=1) and homemaker (n=1). Eighteen of the sample identified as European, two as Māori.

### 3.3.2 Measures

During the assessment interview participants were administered with the PDS, SDQ, Data-processing questionnaire and DES.

*The Post-traumatic Diagnostic Scale (PDS; Foa., 1995)* See the description of the PDS above. As stated in study 1 each item is rated on a severity scale of 0 (being lowest) to 3 (being highest) so that the total score ranges from 0 to 51 (Foa et al.,1995).

*Dissociative Experience Scale (DES; Carlson &Putnam, 1993).* See the description of the DES above. The DES-taxon was analysed separately from the DES-total (all DES ratings).

*The Cognitive Processing Questionnaire (Halligan et al., 2002; Halligan et al.,2003).* The Cognitive Processing Questionnaire measures three aspects of cognitive processing during trauma. This questionnaire consists of the three sections: Data-driven Processing, Self-referent processing and Dissociation. The Data-driven processing questionnaire is an eight-item scale that assesses the extent to which participants primarily engaged in surface level, perceptual processing during trauma (e.g. “It was just like a stream of unconnected impressions following each other;” 8 items, alpha = .88). This scale has been demonstrated to predict the development of analogue PTSD symptoms and disorganized

narratives following exposure to a distressing videotape (Halligan et al., 2002). Dissociation is measured using the nine-item Dissociation Questionnaire (SDQ). Participants are asked to answer on a Likert –type 5-point scale "1 = this applies to me NOT AT ALL" to "5 = this applies to me EXTREMELY." For the purposes of this research the self-referent processing questionnaire was not used. Unlike study 1 where the SDQ measured state dissociation, the current study used the SDQ to measure Peritraumatic dissociation as the SDQ has been used for this purpose in previous studies (Halligan et al., 2003).

*Clinician-Administered Dissociative States Scale (CADSS Bremner et al., 1998)* The CADSS is a 27- item scale measuring present-state dissociative symptomatology. The CADSS has 19 subject-rated items and eight items scored by the observer. For the purpose of this study only the eight-item observer ratings were used. Observer ratings included dissociative responses such as “Did the subject appear to be separated or detached from what is going on, as if not a part of the experience or not responding in a way that you would expect”. The CADSS has been shown to be a reliable and valid instrument for the measurement of present-state dissociative symptomatology (Bremner et al., 1998). This study used observer-rated dissociative symptoms which form a checklist of behavioural markers of state dissociation (see Appendix C). The frequency of dissociative symptoms was rated by the researcher as 0 (not present), 1 (Present occasionally), 2-3 (Present some of the time), 4-5 (Present most of the time), and 5+ (Present all the time). For the purpose of this study the CADSS was used to measure observer-rated state dissociation. The CADSS was used to measure state dissociation because this measure has been used in a number of studies for this purpose (Bremner et al., 1998; Lanius et al., 2002; Bremner et al., 1999). The current study included in this scale two other indicators of dissociation ‘confusion and disorientation’ taken from items 9 and 10 on the PDEQ (Peritraumatic Dissociative Experiences

Questionnaire) and ‘Losing contact with limitations’ as these are considered important in the experience of dissociation.

### 3.3.3 *Procedure*

Four to seven months (June-August) after the 22<sup>nd</sup> February 2011 earthquake a group of Christchurch citizens, film makers and researchers invited people to share their experience of the time when the earthquake struck. These narratives were videotaped (and subsequently transcribed). One hundred and ten interviews were completed and a collection of these are now in the Christchurch Museum and in the University of Canterbury CEISMIC Digital Archive.

For the current research purposes 20 participants/tapes were randomly selected by the film makers with the only criteria that each person had been highly exposed to the earthquake. All participants at the time of making the video tapes agreed they could be used for research purposes. However, each participant was written to out of courtesy to explain that their narratives would be studied to understand more about how the brain process distressing information. This letter asked if they were agreeable to both this, and a one-off assessment interview (see Appendix D).

This one-off meeting was conducted (by Ashleigh Hooper, AH) between August and December in the year following the earthquake (18-20 months post-quake). Participants filled out a consent form (as used in study 1) and then completed the PDS, DES and the Data-driven processing and SDQ components of the Cognitive Processing Questionnaire. These questionnaires were administered as a structured interview to assess the participants’ current level of post-traumatic symptoms related to the February earthquake, their perceptual understanding of what was occurring during the earthquake, and their level of dissociation experienced during the earthquake (peritraumatic dissociation) and in daily life (trait

dissociation). Each assessment interview lasted less than 30 minutes and no information was asked or provided of the person's actual experience during the quake.

After all the interviews were complete one of the researchers (Martin Dorahy, MD) received transcriptions of each video narrative. This researcher removed all the identifiers so that the other researcher (AH) was blind to whose narratives they were coding, reducing the risk of rater-bias. The researcher then coded each narrative for perceptual and conceptual processing as in study 1 (see procedure for study 1). Then the second researcher (MD), who had had no contact at all with participants, rated each narrative following the same method to provide good inter-rater reliability. The intra-class correlation coefficient between the two raters was .91.

Finally, in order to detect dissociative symptoms present during the video-taped retelling of the participant's earthquake experience (state dissociation), participant's dissociative symptoms were assessed from their video narratives using the Clinician-Administered Dissociative States Scale observer markers for dissociation. Both researchers viewed the video narratives and rated the degree of dissociation demonstrated by each participant.

Given the prospective and relatively complex design, a time line is given for ease of elucidation (see Table 2).

Table 2.  
*TimeLine of each Assessment Point*

Traumatic event:-	Assessed 4-7 Months post-earthquake	Assessed 18-20 Months post-earthquake
<b>February 22<sup>nd</sup> 2011 Earthquake</b>	<ul style="list-style-type: none"> <li>• Narrative of earthquake provided</li> <li>• State Dissociation (Observer-rated CADSS)</li> </ul>	<ul style="list-style-type: none"> <li>• PDS</li> <li>• The Cognitive Processing Questionnaire (Data processing Questionnaire &amp; SDQ)</li> <li>• DES</li> </ul>

### 3.3.4 *Ethical Approval*

The study was approved by the University of Canterbury Ethics Committee (see Appendix E).

### 3.3.5 *Statistical Analysis*

Data analyses were conducted using the SPSS statistical software programme (version 20.0). In order to test the relationship between the constructs of PTSD, dissociation and information processing a number of correlations and hierarchical regressions were performed.

To further validate the findings from the correlation analysis a single-case design analysis was also explored and can be found in Appendix F and G to see whether there was a difference between perceptual and conceptual processing scores across participants and whether the difference in processing influenced scores on dissociation and PTSD. This particular analysis also provided a directly similar case-study methodology to study 1.

### 3.3.6 *Checking for Data Normality*

Normality was checked by calculating the skewness and kurtosis for each variable being analysed. For univariate skewness and kurtosis, values less than -1 or greater than +1 are suggested to indicate non-normality (Muthén & Kaplan, 1985). Most measures were considered acceptable within this range. While Avoidance, DEStotal and Data processing were slightly out of this range kurtosis and skewness between +/-2 is usually acceptable. Histograms were further used to visually check for the normality of the data. A visual analysis of the data as well as kurtosis/skewness indicated an outlier score for state dissociation. When this score was omitted from the correlation and regression analyses the score did not result in a change in significance for this variable, therefore this score was

retained to maintain the sample size at 20. Descriptive statistics of each measure can be seen in Table 3.

### 3.4 Results

Table 3.

*Descriptive Statistics of Variables Measured after Earthquake Trauma.*

Variable	Mean	SD	Minimum	Maximum	Alpha ( $\alpha$ )
PSS	14.60	9.46	0	33	-
Re-experiencing	4.70	2.74	0	9	-
Avoidance	4.55	4.47	0	12	-
Arousal	5.35	3.88	0	15	-
DEStotal	14.15	9.92	30	1120	.90
DEStaxon	6.13	6.03	0	180	.49
Peritraumatic Dissoc	1.83	1.07	4	32	.99
Data Processing	1.69	1.08	5	32	.89
Information Process	5.45	.67	67	409	-
State Dissociation	4.20	7.29	0	33	-

*Note: PSS=Symptom scores for PTSD*

In order to investigate the experience of the earthquake in this sample, a variety of descriptive information was gathered from the participants in the PDS. Six participants reported that they were traumatised by the earthquake but it was not the most traumatic experience they had had. Of the 20 participants sampled, six participants were themselves injured during the earthquake and 15 of the 20 participants assessed saw someone else being injured.

Of those sampled, nine people reported a single traumatic experience in their lifetime. The remaining 11 people had experienced more than one traumatic event. Those with single or multiple traumas did not differ on PTSD symptom severity when an exploratory analysis was conducted,  $F(1,18) = .283$ ,  $p = .602$  ns. The sample was, therefore, treated as a whole (single & multiple traumas) in the subsequent analyses.

When PTSD symptomology was measured, it was found that 11 people did not met the diagnostic criteria for earthquake-related PTSD, five people meet the criteria for PTSD and four met the sub-threshold for PTSD based on being positive for all symptom criteria

but not acknowledging experiencing Criterion A2 of the PDS scale (experience of fear, helplessness and horror during the event).

Correlation analyses were performed between post-traumatic symptom severity as measured by the PDS (18-20 months post-quake) and perceptual/conceptual processing of the event as measured four to seven months after the earthquake. The correlation fell marginally short of significance ( $r(18) = .432, p = .057$ ), perhaps due in part to the small sample size. The re-experiencing subscale was positively correlated with information processing (perceptual/conceptual processing scores) which can be seen in Table 4, indicating that the more a narrative is perceptually encoded the more intrusions are experienced. DEStotal and DEStaxon scores were both positively correlated with scores on the PDS for the measure of arousal as shown in Table 4.

Table 4.

*Intercorrelations between trauma-related variables; Dissociation, Trauma processing & PTSD symptoms*

	PSS	Re-exp	Avoid	Arousal	DES Total	DES Taxon	Peri Dissoc.	Data Process	Info Proces	State Dissoc
PSS	-	.872**	.828**	.868**	.479*	.390	.166	.122	.432	.170
Re-exp	-	-	.544*	.793**	.430	.413	.338	.159	.605**	.016
Avoid.	-	-	-	.483*	.308	.093	-.165	-.070	.300	.270
Arousal.	-	-	-	-	.509*	.553*	.356	.266	.280	.092
DEStotal.	-	-	-	-	-	.886**	.590**	.745**	.111	.288
DEStaxon.	-	-	-	-	-	-	.702**	.740**	.056	.026
Peri Dissoc	-	-	-	-	-	-	-	.715**	.141	.047
Data Process	-	-	-	-	-	-	-	-	-.076	.002
Info Process	-	-	-	-	-	-	-	-	-	.006
State Dissoc	-	-	-	-	-	-	-	-	-	-

*Note: PSS (Symptom scores for PTSD); Re-exp=Re-experiencing; Info process=Information Processing (Perceptual & Conceptual); Peri=Peritraumatic; Dissoc=Dissociation*

*\*\* Correlation is significant at the 0.01 level (2-tailed)*

*\*Correlation is significant at the 0.05 level (2-tailed).*



Peritraumatic dissociation was positively correlated with scores on both the DEStotal and DEStaxon (pathological criteria) as shown in Table 4. Data processing (during earthquake) and DEStotal & DEStaxon were positively correlated (see Table 4). Lastly, there was a positive correlation between peritraumatic dissociation and data processing (also shown in Table 4). There was no relationship found between peritraumatic, state and trait dissociation and perceptual/conceptual processing (during the retelling of earthquake experience), or peritraumatic and state dissociation and PTSD scores.

Next, a hierarchical linear regression was performed. This was conducted in order to assess which predictors made a significant contribution to predicting PTSD symptom severity 18-20 months post-earthquake. Whilst there were no correlations found between some of the markers of dissociation and posttraumatic severity, theoretical and previous empirical work has suggested a link. Therefore, all measures of dissociation were included in the regression. Due to its proposed initial value in predicting PTSD, Peritraumatic dissociation, as assessed 18-20 post-quake, was entered in the first step. At step 2, perceptual/conceptual processing and state dissociation, both measured via the video narratives four to seven months post-quake were entered. Finally, trait dissociation (assessed 18-20 months post-quake) was entered.

As shown in Table 5, perceptual/conceptual processing (in both steps 2 and 3) reached near statistical significance. Trait dissociation (in step 3) predicted PTSD symptom severity at 18-20 months. The overall model fell marginally short of significantly predicting PTSD Symptomology  $F(4,19) = .2577$   $p = .080$ . The change in  $R^2$  in the first step did not account for much variance in the model. At step 2, there was an increase in the amount of explained variance to another 20%. The inclusion of in trait dissociation increased the explained variance accounted for by the model to 40% (see Table 5).

Table 5.

*Hierarchical Linear Regression Analysis Predicting PTSD symptoms from Dissociation and Information Processing.*

Predictor Variable	B	PSS $\beta$	$p$	R <sup>2</sup>
Step 1				.028
Peritraumatic Dissociation	1.468	.166	.485	
Step 2				.224
Peritraumatic Dissociation	.881	.100	.661	
Information Processing	5.844	.471	.079	
Perceptual/Conceptual State Dissociation	.211	.163	.471	
Step 3				.407
Peritraumatic Dissociation	-1.966	-	.389	
Information Processing	5.617	.400	.065	
Perceptual/Conceptual State Dissociation	.022	.017	.937	
Trait Dissociation	.535	.561	.048*	

\*Correlation is significant at the 0.5 level.

As re-experiencing and perceptual processing have been theoretically and empirically linked, and consistent with the practice above, a hierarchical linear regression was performed with re-experiencing as the dependent variable. This was conducted to test how much information processing style four to seven months post-earthquake, peritraumatic dissociation retrospectively assessed 18-20 months post-quake and trait dissociation (18-20 months post-quake) predicted re-experiencing symptoms at 18-20 months post-quake. The same variables and step progression was followed as the previous regression.

When perceptual/conceptual processing and state dissociation were added into the regression at step 2, the overall model statistically predicted re-experiencing symptoms,  $F(3,19)= 4.044$   $p=.026$ . Yet only perceptual/conceptual processing made a significant contribution (see Table 6) with the inclusion of trait dissociation (step 3), the overall model remained significant  $F(4,19) = 3.903$   $p=.023$  but again, only perceptual/conceptual

processing significantly predicted PTSD symptoms severity at 18-20 months. The change in  $R^2$  in the first step only accounted for approximately 10% of the variance in the model. At step 2 there was an increase in the amount of explained variance to 40%. The inclusion of in trait dissociation increased the explained variance accounted for by the model to 50%.

Table 6.

*Hierarchical Linear Regression Analysis Predicting Re-experiencing Symptoms from Dissociation and Information Processing*

Predictor Variable	B	Re-experiencing $\beta$	$p$	$R^2$
Step 1				.114
Peritraumatic Dissociation	.864	.338	.146	
Step 2				.431
Peritraumatic Dissociation	.659	.257	.196	
Information Processing	2.309	.569	.009*	
Perceptual/Conceptual State Dissociation	.000	.001	.997	
Step 3				.510
Peritraumatic Dissociation	.119	.047	.840	
Information Processing	2.266	.558	.008*	
Perceptual/Conceptual State Dissociation	-.036	-.095	.627	
Trait Dissociation	.101	.367	.141	

\*Correlation is significant at the 0.5 level.

### 3.5 Discussion

This study (study 2) was designed to assess the relationship between information processing and dissociation using different metrics and different assessment time points. Most previous studies have largely assessed peritraumatic or state dissociation during information processing in the laboratory with analogue or tightly controlled designs (Lytle et al., 2010; Holmes et al., 2004; Kindt et al., 2005; Kindt et al., 2007; Murray et al., 2002). This study used an ecologically valid sample and sought to determine if state dissociation in

earthquake-affected individuals assessed by behavioural coding four to seven months post-quake and peritraumatic dissociation assessed retrospectively by self-report 18-20 months post-quake were related to the processing of peritraumatic earthquake narratives taken four to seven months post-quake. Moreover trait dissociation at 18-20 months was assessed for its association with the earthquake narrative. The findings showed that information processing and these various markers of dissociation were not measurably related when assessed months and years post-trauma.

The second aim of this study was to test whether information processing at four to seven months post-trauma and various forms of dissociation assessed prospectively, retrospectively and currently could be related to PTSD symptoms assessed at least 18-20 months post-trauma in earthquake-exposed individuals. Information processing measured at four to seven months post-trauma was able to predict overall PTSD symptoms and re-experiencing symptoms related to the earthquake assessed 18-20 months post-trauma. In addition to this, trait dissociation was associated with quake-related arousal symptoms when both variables were measured 18-20 months post-trauma. The diagnosis of PTSD (n=5) and partial PTSD (n=4) was present for nearly half of our sample.

### 3.5.1 *The Association between Dissociation and Information Processing*

Most studies have analysed dissociation and information processing at the same interval post-trauma and typically shortly after the distressing event (Lyttle et al., 2010; Murray et al., 2002). Thus, one unique aspect of this study was assessing whether various markers of dissociation assessed relatively soon and then more than one year post-earthquake were associated with PTSD at the later assessment time, and whether information processing style earlier in the post-trauma period mediated this relationship. No relationship was found between information processing and any of the measures of dissociation

examined in this study. Whilst other work has found a link between dissociation and perceptual processing (Lyttle et al., 2010; Ehlers & Clark, 2000), the current findings are not completely inconsistent with the empirical literature and add to it. Firstly information processing was measured via narratives provided some months post-trauma rather than initially after the trauma. It is likely that time elapsed between the quake and the narrative assessment allowed more conceptual processing of the event (e.g., through retelling it to other people prior to assessment) than would have been evident days or weeks after the quake. With more conceptual processing evident in narratives, but still a high degree of perceptual processing in some narratives, there may have been a greater mix of perceptually- and conceptually-driven narratives. This would reduce the likelihood of finding a significant association with dissociation, which was expected to be positively associated with perceptual processing.

Most other studies that have found a link between state dissociation and perceptual processing (e.g., Holmes et al., 2004; Lyttle et al., 2010) have used self-report measures of state dissociation. More objective assessment (e.g., Holmes et al., 2004), and in this study a behavioural assessment approach found no association. It is possible that the behavioural measurement used here, which relied on overt signs of dissociation may not sensitively detect dissociation occurring at a subjective level. Finally, retrospective peritraumatic dissociation may not offer an optimal or accurate assessment of dissociation at the time of trauma, which may reduce its ability to predict cognitive processes after the event. In merging this study and previous ones, it seems the timing and nature of dissociation assessment is central in observing and studying the link between dissociation and information processing.

### 3.5.2 *PTSD Symptoms and Information Processing*

The second major finding from Study 2 involved the relationship between re-experiencing symptoms in PTSD and information processing. It has been well established that deficits in trauma recall are often present for survivors of trauma with PTSD (Bremner et al., 1993, 1995; Bremner, Vermetten, Afzal, & Vythilingam, 2004; Elzinga & Bremner, 2002 ; Gilbertson, Gurvits, Lasko, Orr, & Pitman, 2001; Vasterling, Brailey, Constans, & Sutker, 1998; Yehuda et al., 1995; Yehuda, Golier, Halligan, & Harvey, 2004; Uddo, Vasterling, Brailey, & Sutker, 1993; Vasterling et al., 2002). However, most research has assessed deficits in memory and PTSD symptoms at the same interval following trauma and has not specifically examined perceptual processing outside the laboratory. When information processing was assessed at four to seven months and PTSD symptoms at 18-20 months post-trauma, only the re-experiencing symptom cluster and overall PTSD symptom scores (which nearly reach statistical significance) were found to be related to participant's information processing style. This suggests that those individuals who had an increase in perceptual processing relative to conceptual processing, even six months after the quake, experienced greater levels of PTSD symptoms, especially re-experiencing over 12 months after the quake. Thus, failure to adequately process the experience continues to act as a risk factors for chronic re-experiencing.

The findings expand on previous research linking re-experiencing symptoms and information processing together when assessed initially after trauma (Brewin et al., 1996; Ehlers & Clark, 2000; Foa, Steketee, & Rothbaum, 1989). There have been a number of explanations proposed to account for the link between processing style and the presence or absence of re-experiencing symptoms in the form of intrusions. Kindt, Van den Hout, Artanz, and Drost (2008) propose two theories related to this process. The first suggests that because conceptual processing or the elaboration of trauma is limited after trauma and this

impedes the critical connections created with other associated autobiographical information stored within the memory system, such that the traumatic experience is not diminished by activation of associated memory representations. The second theory contends that conceptual processing allows for flexible memory representations of the trauma and this allows for greater control of memory activation and inhibition of trauma content.

Given the fact that both our study and a range of other research (Kindt et al., 2008; Steel, Fowler, & Holmes 2005; Ehlers, Hackmann, & Michael, 2004; Sündermann, Hauschildt, & Ehlers 2012) support the link between re-experiencing and information processing it is highly likely that there is a strong link between these two constructs after trauma. The present study also provides support for the current information processing models of PTSD and highlights the role strong perceptual processing and weak conceptual processing play in predicting subsequent re-experiencing symptoms (Brewin, Gregory, Lipton, & Burgess 2010; Ehlers, & Clark 2000). The current study was important in affirming this link by showing that with 11 months between the assessment for information processing style and the measuring of re-experiencing symptoms, information processing style was still able to predict this symptom. This finding is important as it allows for the possibility of detecting those at most risk of having chronic re-experiencing symptoms by examining their cognitive representation of the event in terms of perceptual and conceptual processing relatively soon (months) after trauma. In addition to this, interventions that aim to create an elaborated cohesive account of a traumatic experience may best help to prevent the later development of re-experiencing symptoms. It is likely there is a range of factors which contribute to intrusive re-experiencing symptoms in PTSD and these require further investigation, however the relationship between perceptual and conceptual processing and re-experiencing symptoms was found despite a small sample size.

### 3.5.3 *PTSD Symptoms and Dissociation*

Trait dissociation was the only dissociation measure found to be related to PTSD. Whilst the sample contained some rescue or medical personnel, who experience working in high stress and pressure situations daily, and who often have lower numbing and avoidance symptoms (Guo et al., 2004), this form of dissociation was still related to PTSD. Such a finding is consistent with previous work showing a relationship between trait dissociation and PTSD (Dorahy et al., 2012; Kulkarni, Porter, Rauch 2011; Galatzer-Levy et al., 2011). In terms of arousal symptoms, the symptom cluster which correlated with trait dissociation in this study, the relationship between these constructs is considered tenuous. The association between arousal symptoms and dissociation has been explored in previous research (Giesbrecht, Smeets, Merckelbach, & Jelicic, 2007). Giesbrecht et al., (2007) found that certain measures on the DES such as depersonalization/derealisation have been shown to relate to increases in cortisol responses, and increases in cortisol responses have been associated with an increase in arousal in PTSD. In addition to this Giesbrecht and colleagues also found that the Tension-Anxiety subscale of the Profile of Mood States was positively related to trait dissociation in their study.

### 3.5.4 *Strengths and Limitations*

This study limited PTSD diagnosis to the PDS, and not an accompanying clinical interview. Moreover, no data was gathered on participant's previous psychiatric history or whether they had undergone therapy for earthquake-related PTSD. This may reduce the ability to generalise to a clinical sample that experience earthquake or other event-related trauma. If the participants had undergone therapy for PTSD related to the earthquake an effect of therapy may have confounded our results. Finally, the small sample size may have produced some null results not evident in a larger study, pointing to the need for replication



of studies such as this with samples of survivors of other natural disasters. Through this study we were able to demonstrate a number of interesting findings including the association between re-experiencing symptoms and information processing and that between arousal and trait dissociation in PTSD. In addition, this study was able to further add to the literature around dissociation and information processing by using a unique timeframe between assessments in order to detect an association between these constructs.

## Chapter 4 General Discussion

The current studies were conducted in response to research which has found an association between information processing and dissociation after trauma. Most research suggests that as an individual's level of dissociation decreases in response to symptom recovery greater conceptual understanding of the event can take place (Lyttle et al., 2010; Buck et al., 2006). The aim of the present studies was to further investigate this association in those who had experienced earthquake-related trauma and were either treatment-attending for PTSD related to the earthquake or had direct exposure to the earthquake. Taken together these studies suggest that information processing style assessed later than 4 months post- trauma may be able to predict who will have PTSD symptoms, especially re-experiencing symptoms well after the event as found in study 2 and study 1 (case study P1). Although these studies were unable to demonstrate an association between information processing and dissociation, a number of important outcomes were obtained which do support the current link between trauma processing style and the development of PTSD symptoms.

### 4.1 *Dissociation and Information processing*

One of the strengths of this research is that both self-report and observer reporting of state dissociation was used. Study 1 measured state dissociation via self-report measure while Study 2 measured state dissociation via observers rating behavioural markers of dissociation. This allowed a thorough measure of state dissociation in more than one way. The studies indicate that both samples were not high on state dissociation during the retelling of their earthquake narrative.

With reference to peritraumatic dissociation, the timing of assessments for both studies may have contributed to the null results. As participants were asked to

retrospectively report their peritraumatic symptoms at least 12 months post-earthquake this may produce a level of reporting bias. Huntjens et al. (in press) suggest that when retrospective peritraumatic dissociation is measured, reports may be influenced by memorial inaccuracies created by the progression of time and also by memory fragmentation and biases associated with current level of PTSD symptoms.

In terms of trait dissociation measured years post-quake, the current studies found that overall, our samples were not experiencing a high level of trait dissociation as measured by the DES, particularly those participants in Study 2. In Study 2 only a couple of individuals rated high on some of the items, while most rated between 0-10 on most of the items. Studies which have assessed trait dissociation and memory via an analogue memory task (Olsen & Beck 2012) have shown that trait dissociation does relate to performance on implicit memory and explicit memory tasks. However, these studies usually assess memory and dissociation at roughly the same interval unlike the methodology used in Study 2. As our samples were generally low trait dissociators, it may have been difficult to detect an association between information processing and trait dissociation given the time difference between assessing these post-trauma constructs. Given that trait dissociation was measured after a significant time lapse post-trauma it may have been beneficial to measure trait dissociation at the time perceptual-conceptual processing was assessed. For Study 2, the DES taxon did not provide a significant alpha level (0.49) which increases the probability of the results being obtained by chance using this measure. However, the DES taxon was not removed in this study as this measure correlated with the same variables that the DES total correlated with (arousal and data processing).

## 4.2 PTSD

In Study 1 the five participants who were assessed, overall did not rate on the extreme end of the PTSD symptom subscales and in Study 2 only a few people endorsed a number of avoidance behaviours while most rated minimal to no avoidance behaviours. An explanation for the lower endorsement of such symptoms could be a result of the type of trauma experienced. Bødvarsdóttir and Elklit (2004) suggest that natural disasters such as earthquakes are unique relative to traumas such as rape or car accidents in terms of avoidance symptoms. In the aftermath of an earthquake if living in the earthquake affected area it is difficult to avoid reminders of the effects of the earthquake when practical concerns need to be attended to and when aftershocks are unpredictable and frequent. This may mean that while individuals continue to process the trauma solely on a perceptual level they have no choice but to be physically exposed to trauma stimulus regardless of how much anxiety it provokes. This exposure may in fact assist PTSD symptoms recovery (Brewin et al., 1996). Avoidance has also been theorised as initially impeding adequate trauma processing but long-term avoidance however may be an adequate coping strategy for some people and these people may be effectively using this strategy (Creamer, Burgess, & Pattison 1992). As trauma is conceptually processed there is reduced need to avoid-trauma related reminders however, the relationship between avoidance and information processing is weak and may be only related to certain sub-groups (Creamer et al., 1992). This may explain why we found no relationship between information processing and avoidance when avoidance was measured months or years post-trauma. This is also supported by Creamer et al. (1992) who found avoidance strategies become less entrenched overtime and are associated with lower symptom levels long-term as measured 14 months post-trauma.

Neither Study 1 nor Study 2 demonstrates an obvious link between arousal symptoms and information processing. There has been some research supporting the

relationship between arousal symptoms and information processing (Bartone, Ursano, Wright, & Ingraham 1989; Hodgkinson, & Shepherd 1994). The theoretical explanation for the link between data-driven processing (perceptual processing) and arousal suggests that engaging in this processing style and experiencing intense arousal and fear during the trauma can cause an individual's capacity to rapidly assimilate the information to be overloaded thus affecting the ability for in-depth processing (Halligan et al. 2002). The current studies receive support from other literature however, investigating the link between arousal and information processing. McNally (2003) suggests that while some theorists believe that the relationship between memory and arousal is captured by an inverted-U function, he suggests that this relevance to encoding and retrieval of traumatic experiences is tenuous, at best. The current results also support the findings from a study by Foa et al. (1995) show that there may be other factors which are more related to conceptual processing (attempts to reflect on thoughts and attempts to comprehend the trauma) such as decrease in depressive symptoms rather than trauma-related anxiety, anxiety is linked to arousal symptoms in PTSD.

Together these studies show that information processing style may have the potential to affect an individual's recovery from trauma in terms of re-experiencing symptoms but not arousal or avoidance symptoms when assessed at least a year post-trauma. Interestingly, the daily experience of dissociation (trait) was shown to be related to how much arousal an individual experiences after trauma. Study 2 supports the findings from Study 1 which found that there was no evidence for dissociation mediating the link between information processing and PTSD when these constructs are measured at least 12 months post-trauma.

#### 4.3 *Strengths and Limitations*

Even though these studies failed to find an association between information processing and dissociation other important findings were detected, including an association between information processing and re-experiencing symptoms as well as overall PTSD

symptoms and, in Study 2, trait dissociation and arousal symptoms after trauma. The current methodology allowed a substantial time delay between the earthquake and post-trauma assessments and trait dissociation still showed an association with arousal symptoms in PTSD. In addition perceptual processing was related to re-experiencing symptoms in both studies even when they were assessed at significantly different time points post-trauma as in Study 2. This demonstrates that the measure of narrative coding developed by Buck et al. (2007) was effective at separating perceptual processing from conceptual processing styles after earthquake trauma.

There are a number of limitations to the current studies. First, only earthquake survivors were assessed and many were not positive for PTSD, thus it may be difficult to generalise these findings to other traumatic events where the experience of trauma may be personal in nature (i.e., assault or rape). However, the findings from this study should be relevant to other types of disaster traumas. In addition, for Study 2 no clinician assessment for PTSD was carried out to verify PDS (structured interview) results, and the researchers were not aware of participant's psychiatric history or whether they had undergone therapy for earthquake-related PTSD. An effect of therapy for example may have influenced results by allowing people to have more conceptual representations of the event and potentially reduced dissociation, which may be less evident in those without therapeutic input. Thus the results may not be able to generalise to a clinical sample that experience earthquake-related trauma.

Second, the sample sizes for both studies were small. This may mean that there were other factors which could have influenced these individuals which could in turn influence how they rate their PTSD symptoms and dissociation. For instance, individuals who agreed to take part in this study may be more likely to have a higher level of functioning (Study 2)

and maybe more comfortable discussing their symptoms and answer questions related to them (studies 1 and 2).

#### 4.4 *Future Directions*

There are a number of other factors which have been shown to be important in affecting the level of post-trauma coping long-term such as social support and trait anxiety. As these may be factors that influence the level of dissociation and cognitive processing of trauma experiences long-term they should be explored further.

The results from both studies also confirm that peritraumatic dissociation should be measured initially after trauma and not months or years later in order for this measure to have predictive power in ascertaining an individual's risk of developing PTSD. The current research showed that when peritraumatic dissociation was assessed a number of months after trauma, peritraumatic dissociation was not associated with current PTSD symptomology. Retrospective reporting of peritraumatic dissociation could be unreliable and be under-reported. Therefore studies assessing this construct need to assess this as soon after trauma as possible.

Future research could investigate whether assessing state dissociation as we did in these studies via observer and self-report and information processing via trauma narrative is more accurate at detecting a relationship between information processing and state dissociation or whether state dissociation and information processing should be assessed using an experimental method such as priming as used by Lyttle et al., (2010).

#### 4.5 *Conclusions*

Both studies have tentatively confirmed that cognitive processing style (perceptual and conceptual processing) predicts the level of re-experiencing symptoms as well as marginally predicting overall PTSD symptoms when measured a number of months post-

trauma. Study 2 found no relationship between any of the measures of dissociation and information processing when state dissociation and information processing was assessed at four to seven months post-trauma and trait and peritraumatic dissociation measured at 18-20 months post-trauma. Trait dissociation measured at the later time post-trauma was able to predict arousal symptoms when the participant's level of PTSD symptoms was assessed 18-20 months after the earthquake. In Study 1 only one participant (P3) showed improvement in arousal symptoms and trait dissociation across therapy, however, their arousal symptoms only marginally improved.

We hypothesized that there is a strong association between dissociation and information processing in the development and maintenance of PTSD symptoms. No study to date has measured dissociation and information processing at the time intervals post-trauma as was done in this study, nor have they used a case-study design to investigate these constructs in therapy attending individuals. This hypothesis was not confirmed by the current studies. However, results showed that in both studies there could be a possible association between information processing and PTSD at least for some individuals who experience earthquake-related trauma.



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## APPENDICES



### *Appendix A. Consent form used in Study 1 and Study 2*

**Title of Project:**                      **Consent Form**

**Is there a link between dissociation, perceptual processing, and conceptual processing before, during and after treatment for Posttraumatic Stress Disorder?**

**Name of researchers**

Ashleigh Hooper (Researcher/MSc Psychology Student, University of Canterbury); Martin Dorahy (Clinical Psychologist/Senior lecturer, University of Canterbury);

Name of Researcher:

**Please initial box**

1. I confirm that I have read and understand the information sheet dated ..... for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.

☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my care or legal rights being affected. If I complete the study my individual data will be merged with data from other participants and only the research team and an independent rater bound by a confidentiality agreement will see the data.

☐

3. I understand that if the researcher becomes aware that I have serious intentions to hurt myself or someone else, they will contact the relevant people.

☐

4. I agree to take part in the following study

☐

5. Please tick the following box if you would like your data passed onto your therapist

☐

6. I consent that my data be merged with all the other data and become part of a publication in a mental health journal

☐

Name of Participant  
Researcher/clinician

Signature  
Signature

Date  
Date

*This project has been reviewed and approved by the University of Canterbury Human Ethics Committee*

## *Appendix B1. Central Regional Ethics Approval*

### **Central Regional Ethics Committee**

c/Ministry of Health PO Box 5013 1 the  
Terrace Wellington Phone: (04) 816 2403  
Email: central\_ethicscommittee@moh.govt.nz



12 April 2012

Dr Jenny Jordan University of Otago  
Christchurch School of Medicine  
Department of Psychological Medicine  
P O Box 4345 Christchurch

Dear Dr Jordan

Ethics ref: **CEN/12/03/003** (please quote in all correspondence) Study title: Efficacy of cognitive therapies during an active earthquake sequence – a feasibility study Investigators: Dr Jenny Jordan, Dr Caroline Bell, Dr Janet Carter, Associate Professor Richard Porter, Dr Virginia McIntosh, Dr Cameron Lacey, Professor Peter R Joyce, Associate Professor Christopher Frampton, Dr Martin Dorahy, Ashleigh Hooper

This study was given ethical approval by the Central Regional Ethics Committee on 5 April 2012. A list of members of the Committee is attached.

#### Approved Documents

- National Application Form
- Part 5 : Use of Human Tissue
- Appendix 1 –The Mini-International Neuropsychiatric Interview (M.I.N.I.)
- Appendix 2 –Section A2.2
- Appendix 4 –Section A5.4
- Appendix 5 –Section B7 2.2.12
- Locality assessment –Clinical research Unit, University of Otago
- Maori Consultation letter signed and dated 4 August 2011 by Elizabeth Cunningham
- Consent Form, version 2, dated 14 March 2012
- Information Sheet, version 2, dated 14 March 2012
- HRC Report 12/732
- Leaflet
- National Centre for PTSD, Revised July 1998
- CAPS Summary Sheet

This approval is valid until 30 June 2014, provided that Annual Progress Reports are submitted (see below).

Access to ACC For the purposes of section 32 of the Accident Compensation Act 2001, the Committee is satisfied that this study is not being conducted principally for the benefit of the manufacturer or distributor of the medicine or item in respect of which the trial is being carried out. Participants injured as a result of treatment received in this trial will therefore be eligible to be considered for compensation in respect of those injuries under the ACC scheme.

Amendments and Protocol Deviations All significant amendments to this proposal must receive prior approval from the Committee. Significant amendments include (but are not limited to) changes to: – the researcher responsible for the conduct of the study at a study site – the addition of an extra study site – the design or duration of the study – the method of recruitment – information sheets and informed consent procedures. Significant deviations from the approved protocol must be reported to the Committee as soon as possible.

Annual Progress Reports and Final Reports The first Annual Progress Report for this study is due to the Committee by 12 April 2013. The Annual Report Form that should be used is available at [www.ethicscommittees.health.govt.nz](http://www.ethicscommittees.health.govt.nz). Please note that if you do not provide a progress report by this date, ethical approval may be withdrawn.

A Final Report is also required at the conclusion of the study. The Final Report Form is also available at [www.ethicscommittees.health.govt.nz](http://www.ethicscommittees.health.govt.nz).

Requirements for the Reporting of Serious Adverse Events (SAEs) SAEs occurring in this study must be individually reported to the Committee within 7-15 days only where they: – are *unexpected* because they are not outlined in the investigator's brochure, and – are not defined study end-points (e.g. death or hospitalisation), and – occur in patients located in New Zealand, and – if the study involves blinding, result in a decision to break the study code.

There is no requirement for the individual reporting to ethics committees of SAEs that do not meet all of these criteria. However, if your study is overseen by a data monitoring committee, copies of its letters of recommendation to the Principal Investigator should be forwarded to the Committee as soon as possible.

Please see [www.ethicscommittees.health.govt.nz](http://www.ethicscommittees.health.govt.nz) for more information on the reporting of SAEs, and to download the SAE Report Form.

Statement of compliance The committee is constituted in accordance with its Terms of Reference. It complies with the [Operational Standard for Ethics Committees](#) and the principles of international good clinical practice.

The committee is approved by the Health Research Council's Ethics Committee for the purposes of section 25(1)(c) of the [Health Research Council Act 1990](#). We wish you all the best with your study. Yours sincerely



Emma Phelan Administrator Central  
Regional Ethics Committee Email:  
[emma\\_phelan@moh.govt.nz](mailto:emma_phelan@moh.govt.nz)

**Appendix B2. University of Canterbury Ethics Approval**



HUMAN ETHICS COMMITTEE

Secretary, Lynda Griffioen  
Email: [human-ethics@canterbury.ac.nz](mailto:human-ethics@canterbury.ac.nz)

Ref: HEC 2012/19

23 March 2012

Ashleigh Hooper  
Department of Psychology  
UNIVERSITY OF CANTERBURY

Dear Ashleigh

The Human Ethics Committee advises that your research proposal “Dissociation, Perceptual Processing, and Conceptual Processing in Survivors of the Christchurch Earthquakes 2011” has been considered and approved.

Please note that this approval is subject to the incorporation of the amendments you have provided in your email of 19 March 2012.

Best wishes for your project.

Yours sincerely

Michael Grimshaw  
**Chair**  
**University of Canterbury Human Ethics Committee**

## Appendix C. Behavioural Dissociation Checklist

### Behavioural Markers of Dissociation Checklist

<b>Dissociative Behavioural Feature</b>	<b>Not present (0 times)</b>	<b>Slightly ( 1 times)</b>	<b>Moderately ( 2 times)</b>	<b>Considerably (3 times)</b>	<b>Extremely (4 times)</b>
<i>Blank out/ spacing out in a way where they appear like they have lost track of what is going on</i>					
<i>Seems confused/disorientated (items 9 and 10 on PDEQ)</i>					
<i>Separate or detached from what is going on- as if not part of the experience/ not responding in an expected way</i>					
<i>Say something bizarre or out of context, not speak when expected</i>					
<i>Bizarre behaviour, unexpected manner, show no movement at all (stiff, wooden)</i>					
<i>Need to be put back on track, or grounded in the here and now during or after the experience</i>					
<i>Twitching or grimacing in the facial musculature</i>					
<i>Unusual rolling of the eyes upward or fluttering of the eyelids</i>					
<i>Losing contact with limitations</i>					
<b>Taken from CADSS-Bremner et al., 1998 and PDEQ- Marmar et al., 1997; Marmar et al., 1994</b>					

**Appendix C.** Every indication of dissociation the researchers individually put a mark in the corresponding box marks were added together to give a total observer dissociation score for each participant.

***Appendix E. University of Canterbury Ethics Approval***



**HUMAN ETHICS COMMITTEE**

Secretary, Lynda Griffioen  
Email: [human-ethics@canterbury.ac.nz](mailto:human-ethics@canterbury.ac.nz)

Ref: HEC 2012/85

22 August 2012

Ashleigh Hooper  
Department of Psychology  
UNIVERSITY OF CANTERBURY

Dear Ashleigh

The Human Ethics Committee advises that your research proposal “Dissociation, Perceptual Processing, and Conceptual Processing in Survivors of the Christchurch Earthquakes 2011” has been considered and approved.

Please note that this approval is subject to the incorporation of the amendments you have provided in your email of 25 July 2012.

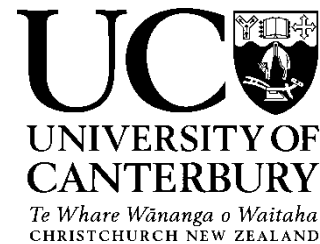
Best wishes for your project.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Michael Grimshaw'.

Michael Grimshaw  
***Chair***  
***University of Canterbury Human Ethics Committee***

*Appendix D. Letter for use of Videotapes and participating in Interview*



**College of Science**

Department of Psychology  
Tel: +64 3 364 2902, Fax: + 64 364 2181

Dear .....,

You may recall you met with Sandra Close and her team to tell your story about your experience of the February earthquake and you agreed that this could be used to further understand how event such as earthquakes impact on people. Along with two research and clinical psychologists from the University of Canterbury (UC), we are now looking through your story to see if we can understand more about how the mind takes in and make sense of distressing events. This work is being done by Ms. Ashleigh Hooper (Psychology Masters student) and Associate Professor Martin Dorahy (Clinical Psychologist) from the UC.

We wondered if as part of this process you would consent to meeting with Martin or Ashleigh for approximately 30 minutes to see how things are going for you now. This will involve completing 3 short surveys. If we are agreeable to this, please contact Martin on 3643 416 or [martin.dorahy@canterbury.ac.nz](mailto:martin.dorahy@canterbury.ac.nz)

We want to assure you that all the necessary measures will be done to protect your identity; your narratives which you so kindly shared with us will be viewed solely by Ashleigh and Martin.

It may be that in the future this work will be written up for scientific publication so others can learn from the experience of people in Christchurch. If this occurs your identity will be protected and your information will be merged with others who told their story.

If you have any question or are agreeable to take part in this work, please contact Martin Dorahy (3643 416 or [martin.dorahy@canterbury.ac.nz](mailto:martin.dorahy@canterbury.ac.nz))

Kindest Regards,

Sandra Close  
Ashleigh Hooper  
Martin Dorahy

## Appendix F. Frequency Histograms

Each participant's scored from score 1-9 (1 conceptual- 9 perceptual) on their transcripts was graphed so percentage of each degree of perceptual and conceptual processing was evident. The following graphs represent the general pattern of the U and J shaped graphs.

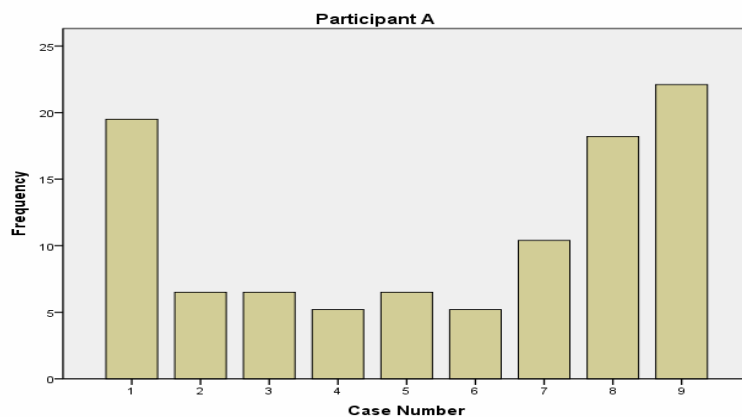


Figure F1: An example of an individual who had a U shaped Graph Representing high Conceptual Processing. 13 individuals had a U shaped graph representing high conceptual processing.

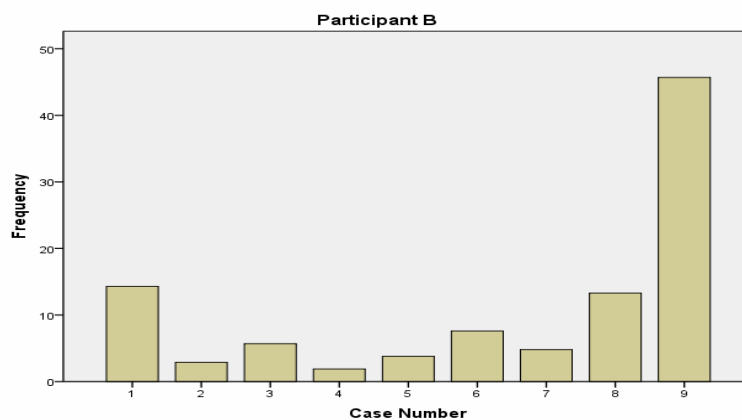


Figure F2: Example of an individual who had a J shaped Graph Representing high perceptual processing. 7 individuals had a J shaped graph representing high perceptual processing.



**Appendix G. Descriptive Statistics of J and U shaped-Graphs Representing Perceptual and Conceptual Groups**

Measure	M	SD	F	p
PSS U shape	11.64	21.50	5.69	.04
PSS J shape	9.56	4.51		
Re-experiencing U shape	3.57	2.34	12.93	.00
Re-experiencing J shape	7.33	1.51		
Avoidance U shape	3.43	4.45	3.30	.09
Avoidance J shape	7.17	3.55		
Arousal U shape	4.64	4.22	1.60	.22
Arousal J shape	7.00	2.53		
DEStotal U shape	14.04	11.77	.01	.94
DEStaxon U shape	6.43	7.14		
DEStaxon J shape	5.42	2.19		
PeriDissoc U shape	1.39	1.23	.13	.72
PeriDissoc J shape	1.20	.36		
Percep/Concep U shape	5.07	.33	69.59	.00
Percep/Concep J shape	6.34	.26		
State Dissoc U shape	4.71	8.58	.22	.64
State Dissoc J shape	3.00	2.83		

**Appendix G.** Descriptive Statistics of U and J shaped graphs, differences in Perceptual and Conceptual Narratives. Narratives which had <20% difference between their perceptual and conceptual scores were grouped together, likewise, narratives which had >20% difference between their perceptual and conceptual scores were grouped together, leaving two categories.